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SOME GEOGRAPHIC INFLUENCES IN THE SETTLEMENT OF MICHIGAN AND IN THE DISTRIBUTION OF ITS POPULATION

By GEORGE J. MILLER
School of Education, University of Chicago

Physical Configuration

Location. Michigan is situated on the northern boundary of the United States and among the Great Lakes. Its position in the interior of a great land mass determines a continental type of climate, but fortunately this is modified by the influence of the Great Lakes. The Lower Peninsula projects like a great arm between Lakes Michigan and Huron and across a great continental highway of commerce, while the Upper Peninsula occupies an important position in relation to the commerce of the Northwest. Michigan's location has been from the first an important factor in shaping its history. The influence of its location first appears with the French occupation in 1641. The French recognized the strategic and commercial importance of the lake position and placed their settlements accordingly. Its effects are further seen in the occupation by the English and their attempt to retain possession of the country after legally surrendering it; in the determined efforts of the United

States to gain possession; in the settlement and distribution of population; in the distribution of cities and industries; and in the development of its natural resources of forests, minerals, and soils.

Topography. The general elevation of the Upper Peninsula is 400 to 1400 feet above Lake Superior (Fig. 1) and that of the Lower

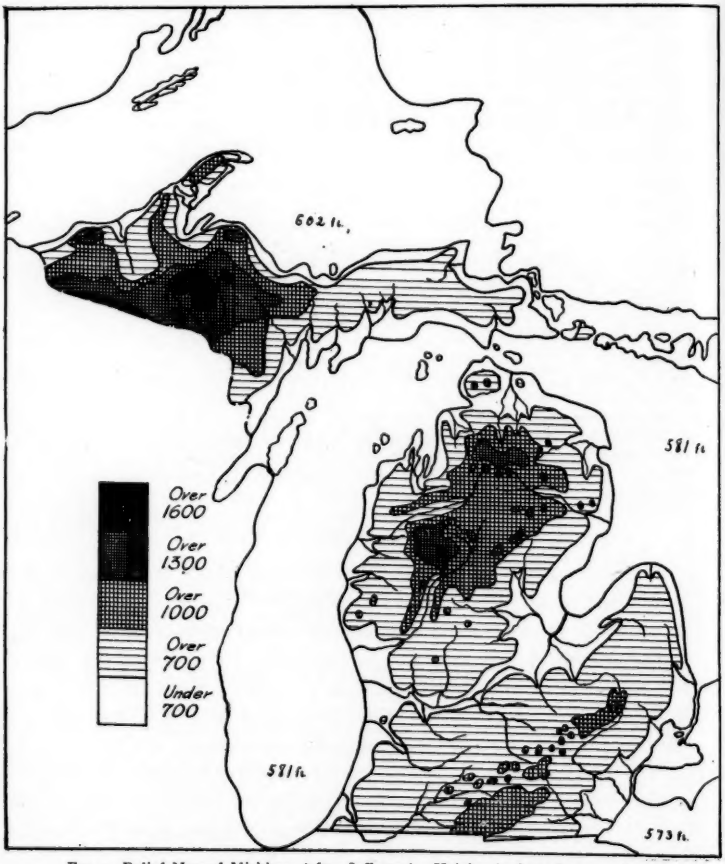

FIG. 1—Relief Map of Michigan (after Jefferson). Heights in feet above sea level.

Peninsula from 400 to 600 feet above the surrounding lakes. The eastern and western portions of the former present marked topographical and geological differences. The western portion is quite rugged, some of the hills reaching 1200 to 2000 feet above sea-level.

The copper ranges composed of Proterozoic (Precambrian) rocks extend from Keweenaw Point to the Wisconsin line. The iron ranges of Iron, Gogebic, and Marquette Counties* lie to the south and east of this group. The eastern portion of the peninsula slopes southward to Lake Michigan from a watershed that lies near Lake Superior. This section is underlain by Cambrian, Ordovician and Silurian sedimentary formations that dip gently to the south, and therefore lacks much of the ruggedness of the western part. The details of the topography are in general controlled by a thick mantle of glacial drift, especially in the east.

The Lower Peninsula is an undulatory plain; the hills are rounded and seldom constitute conspicuous features. The northern part of the peninsula is higher than the southern and culminates in a watershed which, in Osceola County, is about a thousand feet above the lake level. The Huron shore is generally low and is being extended lakeward in most places, while the western shore is characterized by bold bluffs which are being worn away. The watershed of the southeastern part coincides with a northeast-southwest line through Hillsdale and Lapeer Counties. The drainage, therefore, is to the northwest and southeast. The ascent from the east to this watershed is so gradual that, in crossing the peninsula by way of the valleys, it would scarcely be recognized. These watersheds are separated by a strip of land extending from Saginaw Bay to the mouth of Grand River on Lake Michigan, which is said not to exceed 72 feet above the lake level.† This strip marks approximately the former connection between the glacial Lakes Chicago and Saginaw. It is low, nearly level, and has a very fertile soil, the effects of which are seen in the distribution of population (Figs. 9, 10, 16) and in the size of farms in 1904 (Fig. 15). This ancient valley with its rich soils is likely to be of increasing importance in the economic life of the state.

Rivers of the Lower Peninsula. The most important rivers of the western slope are the Manistee, Muskegon, Grand, Kalamazoo and St. Joseph. The last three have their sources within an area of a few square miles in Hillsdale County. The principal river of the eastern slope is the Saginaw, which has several large and important tributaries. The rivers from the north and west are led to

* The location of counties, places, etc., mentioned more especially in the section on the history of settlement, which may not be familiar to the reader, can be referred to in any general atlas, *e. g.*, the Century Atlas (Vol. XII of the Century Dictionary & Cyclopedia), Pls. 22 and 23.—ED.

†R. Adams: *Publ. Mich. Pol. Sci. Assoc.*, Vol. 3, p. 163.

it by the Tittibawassee; those from the south and southeast by the Shiawassee and Flint; and those from the east and southeast by the Cass. Many smaller streams lead in all directions to the lakes from the watershed in the northern part of the peninsula. None of the rivers mentioned are navigable to any great extent, yet in some cases the mouths are deep and wide enough to serve as harbors for medium-sized vessels, and the Saginaw may be navigated by such vessels for a few miles. The rivers furnish, however, an ample supply of waterpower, and those which flow through the timber area have been of vital importance to the lumber business as mediums for transportation from well-nigh inaccessible parts of the interior. The utilization of the greatest portion of Michigan's vast pine timber would have been delayed many years but for these streams. They not only aided but hastened the development of the lumber industry, and hence the settlement of the state. In recent years the importance of the rivers has been lessened by the railroad. The Muskegon and Saginaw Rivers with their tributaries have been of greatest importance in the lumber trade.

Surface Formations. The surface of the state is covered with Pleistocene deposits, with the exception of a few small localities. These deposits of drift range from a few inches to several hundred feet in thickness, many rather than few feet being the average. It is this deep mantle of glacial material that gives shape to the surface. The glaciers deposited an indiscriminately mixed mass of all kinds of rock material from fine clay to large boulders. Not all of the drift, however, occurs in this heterogenous condition, for water was always present and was constantly sorting and resorting the fine from the coarse and redepositing it in alternating beds of clay, sand and gravel. When the ice receded, the surface of Michigan was studded with lakes of varying sizes. More than 5,000 remain, and hundreds more have left evidence of their former existence. The famous "white oak openings" are said to mark the beds of former lakes, and this is probably true in some cases at least. Michigan owes to the Ice Age its great variety of soils, varying from the fertile clay and sandy loams of the central valley to the infertile sands of the jack-pine plains. Its agricultural possibilities, so far as soil is concerned, were determined at this time, and the activity of the people since the earliest settlement has been an effort to adjust properly their crops to the conditions imposed. Nature had nearly accomplished the adjustment of plant growth to the soil before man came and had distributed her great forests and allied vegetation in accordance

thereto. The original timber distribution represents, therefore, a nearly accurate soil map of the state.

One should see the Lower Peninsula lying before him like an outstretched hand. In the palm, which extends from the mouth of the Saginaw River to that of the Muskegon, and which includes scarcely a third of the state, are its orchards, vineyards, gardens, granaries, and its flocks and herds. This third of the state yields more than three-fourths of its total commercial product. Here is nearly all of the coal and salt of the state; 73 per cent. of the entire population; 64 per cent. of its cities of over 10,000 inhabitants, and all of more than 13,200. Here are its principal manufactures and more than 75 per cent. of its railways. A region so varied in soils, so pleasantly diversified in surface, and favored in climate above most other districts of the United States in the same latitude, was destined from the beginning to have its history greatly influenced thereby.

History of Settlement

Fur Trade Attracts the French. It was this Great Lakes region, and especially Michigan, where "the western currents of French and English colonization, starting from distant points on the St. Lawrence and along the Atlantic, after a century and a half of unfriendly rivalry, with occasionally bloody and devastating wars, met at last and blended in a peaceful and prosperous commonwealth."*

The St. Lawrence and its tributaries guided the French to Lake Huron and to Michigan. Their subsequent operations in the Michigan territory looked first and chiefly to profitable fur trade with the natives, and secondarily to their conversion. Trade and religion, however, were inseparably united, and so the localities best suited to the priest and to the trader were identical. The population of the French posts usually consisted of a commandant, Jesuits, soldiers, traders, halfbreeds, savages, all of whom took their respective parts in a system of religion and trade. Missionaries and traders understood each other perfectly and seldom failed to work in harmony.

Strategic Positions Selected for Trading Posts. The greater portions of the shores of the lakes were well known before the opening of the eighteenth century, and the "key" positions had been determined. As early as 1641 two Jesuit Fathers visited the passageway between Lakes Huron and Superior and established a

* T. M. Cooley: Michigan, p. 1.

mission for the Chippewas. Sickness and death, however, caused its early abandonment. The importance of this location was too great for it to be given up permanently, and Father Marquette was accordingly sent there in 1668, and founded the first permanent settlement in the state. In 1671, being relieved at the Sault, he gathered the Indians about him at the passageway between Lakes Michigan and Huron and founded St. Ignatius. Michilimackinac, he says, "is the key and, as it were, the gate for all the tribes from the south, as the Sault is for the north, there being in this section of the country only these two passages by water; for a great number of nations have to go by one or the other of these channels in order to reach the French settlements. This represents a peculiarly favorable opportunity, both for instructing those who pass here and also for obtaining access and conveyance to their places of abode." He adds that this place is "the home of the fishes;" though existing elsewhere in large numbers, this is really their "home." "It is this attraction that has heretofore drawn to a point so advantageous the greater part of the savages in this country, driven away by fear of the Iroquois." Such locations soon became ideal trading posts.

The route for Indian trade at this time, from Montreal and Quebec, was by way of the Ottawa River, Lake Nippissing, the French River, Georgian Bay and Lake Huron to Sault Ste. Marie and the Straits. The passageway between Lakes Huron and Erie was known, yet little if any used before 1700. Its importance, however, was known to the colonial authorities after the journey of Galinee in 1670. About this time Antoine de la Motte Cadillac appeared upon the scene. He was a man of mark and ability, quick to grasp the geographic importance of the situation, quick to form his plans, and equally enthusiastic in their execution when offered the opportunity. He became convinced (1) that here, rather than at any of the upper stations, friendly Indians could be concentrated for their own protection and that of the French; (2) that from this point the fur trade could best be controlled;* and (3) that the strategic† as well as the commercial advantages of this location were greater than those of any other point on the lakes. He desired a point within easy reach of Lake Erie, with high banks, and with easy access to the deep channel of the river; having unrestricted communication with the country in the rear;‡ and with a climate and soil that would make agriculture profitable, assuring sufficient food for a growing and permanent community.§ A point with these

*T. M. Cooley: Michigan, p. 18.
†Land Marks of Detroit, pp. 3–5.
‡H. A. Griffin: *Mag. of Western History*, Vol. 2, p. 573.
§T. M. Cooley: Michigan, p. 19.

advantages was selected, and a settlement made in 1701, which was subsequently called Detroit.

Detroit is nearly 800 miles from the seaboard and in the ordinary course of colonial development would probably not have been settled before the beginning of the nineteenth century. The reasons that Detroit antedated "by a full century the progress of empire westward is the fact that she stands at the gateway of navigation to the great Northwest, and the whole lake system was narrowed down to her situation as if to impart velocity to the current of her career."* The later growth and distribution of population in the southern peninsula together with the development of agricultural and other industrial interests, and the attendant railroad construction, made Detroit the metropolis of the state and one of the most important cities in the lake region. From 1701 to 1830 the history of Detroit is, in the main, the history of Michigan.

As we think to-day of these three "keys" to Michigan and the Northwest, we seldom recall how long ago great significance was attached to their location, and how far it put them ahead of the western tide of civilization. The early date at which historical importance attaches to the Michigan straits between the lakes may be emphasized by comparison with other well known events. The Mackinac Straits and Sault settlements were founded one and two generations respectively before Detroit, yet William Penn located his land grant only 19 years before Cadillac founded Detroit. Detroit was 53 years of age when George Washington began his fort at Pittsburg, hundreds of miles in advance of civilization; and 129 years old when the site of Chicago was surveyed.* Its two centuries of existence have been remarkable. "Five times its flag has changed; three different sovereignties have claimed its allegiance, and since it has been held by the United States, its government has been thrice transferred, twice it has been besieged by the Indians, once captured in war, and once burned to the ground!"†

Non-Development Leads to French Failure. Paradoxical as it may seem, Michigan's "keys" to the lake region and the Northwest were among the ultimate causes of the French failure to hold permanently the country they had explored. As stated previously, these points were occupied primarily as trading stations, and a full century of French occupation did not change their character. The well-laid plans of Cadillac were ignored and very little agriculture or home making was attempted or encouraged. The settlements

* H. A. Griffin: *Mag. of Western Hist.*, Vol. 2, p. 575.

† *Western Monthly Mag.*, Vol. 3, p. 244. Address before Michigan Hist. Soc., 1834.

were hundreds of miles from the French seat of government at Quebec, with a trackless wilderness between. The tie binding them to the soil was very weak, only slightly stronger than that of the savage, and they were engulfed by the very vastness of the expanse which they were attempting to occupy. In spite of their strategic positions they proved unable to withstand the slower but irresistible advance of the English, who left unoccupied land behind them for a short time only, and by building homes and tilling the soil secured a much stronger hold upon the country. Since that time the ties binding the people of the state to the soil have become ever stronger, although a complete adjustment has not yet been secured. The British relinquished the Northwest to the United States with great reluctance. The importance of its location led Englishmen to remain in Michigan after the Treaty of Paris. By holding the region, England continued to control the lucrative fur trade and possessed a vantage ground from which to renew the war against the United States. Furthermore, retention of the posts upon the Great Lakes would enable the English to retain the support of the Indians, who constituted a "buffer state" between the Northwest and the tide of American settlement that was slowly advancing toward the Ohio. There is ample evidence that, to accomplish this end, they incited the Indians to commit most terrible crimes against the American settlers.*

Settlement Delayed by Erroneous Ideas of Geography. The settlement of Michigan was delayed by erroneous notions of its geography. It was commonly believed that a fine belt of territory lay along the eastern border, but that the interior was a vast swamp which might well be left to the fur-bearing animals and to the trappers and hunters.† Even the geographer Morse taught this in his books then used in colleges and schools. Support was likewise given to it by Government surveyors who made an examination extending 50 miles north of the Ohio and Indiana boundary lines, reporting that they found only tamarack swamps, bogs and sand barrens, with not one acre in a hundred, if there were one in a thousand fit for cultivation.‡ Such a report would have been impossible had the work been honestly done. It was accepted, however, and did much to divert the emigrant to Illinois and the Middle West.

Active Settlement Begins. The settlement of Michigan did not begin actively until after 1812 (Fig. 2). From 1800 to 1810, the

* Landmarks of Detroit, p. 227. † T. M. Cooley: Michigan, p. 192.

‡ Rept. of Surveyor General of Ohio, 1815. Cited by R. C. Kedzie: Michigan and Its Resources, (1893), p. 24.

population increased 1,005, or 26 per cent. The settlers, almost without exception, followed the water courses, as they afforded the only means of transportation. In December 1811 the inhabitants of the state were distributed as follows: 1,340 on the Raisin, Miami and Huron Rivers of Lake Erie; 2,227 at Detroit, along the Rouge, Ecorse and Huron Rivers of Lake St. Clair, and 1,070 on Mackinac Island and in the scattered northern settlements.*

Two million acres of bounty land had been set aside to induce settlers to come to Michigan, but few came owing to the false impressions of its soil and climate. Not until 1818 was a public land office secured for the territory and not until then did rapid settlement begin. The same year marked the opening of steam navigation on the Great Lakes, the first steamboat reaching Detroit in 1818 and Mackinac the next year. The influence of the steamboat was little felt before 1820, but later it assured to the emigrant a cheap, convenient means of reaching the West. During the decade from 1810 to 1820 the population nearly doubled, increasing 87 per cent., most of the increase being from immigration in the last two or three years of the period.†

At the beginning of the next decade most of the people were confined to the southeastern lake front and along the lower courses of streams. Mount Clemens had sprung up at the mouth of the Clinton River, a grist and saw mill had been erected and a schooner was plying (1821) between the new town and Detroit. This gave the village a prestige over other surrounding settlements, and Macomb County soon began to increase rapidly in population, reaching 2,400 by 1830; 9,700 by 1840; and 15,500 by 1850. In 1828 an additional impetus was given by the construction of a Government road from Detroit to Lake Huron.‡ Pontiac, a few miles farther up the Clinton River, also had become an important center. It was connected with Detroit by road in 1818, and in 1820 became the county seat of Oakland County. Settlers were attracted to Oakland County because of (1) its nearness to Detroit and (2) its many "openings" and good soil. Its geographic position "gave it unusual commercial and political importance."§ In 1830 it had 4,900 inhabitants, in 1840, 23,600, and by 1850, 31,200. The counties bordering Lakes Erie and Huron grew rapidly following the advent of the steamboat. Monroe had a population of 3,300 in 1830, and of 9,900 in 1840; St. Clair, 1,100 in 1830 and 4,600 in 1840; and Wayne, 6,700 at the beginning and 24,100 at the close of the same decade.

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* American State Papers. Cited in Census of Michigan, 1904, Vol. 1, p. xvi.
† Census of Michigan. Vol. 1, p. xvii. ‡ *Ibid.*, p. xviii. § Census of Michigan, 1904, Vol. 1, p. xviii.

Erie Canal Hastens Settlement. The great event of this period (1820 to 1830) "and that which had most to do with giving sudden impetus to the growth of Michigan and bringing to it the population that shortly had planted settlements and reared churches and school houses all through its central and southern parts, was the opening in 1825 of the Erie Canal."* The influence of this canal together with Great Lake steam navigation on the development of Michigan and the Middle West can scarcely be overestimated. "The following year (1826) found at least a half dozen steamers plying on the lakes and the trip from Buffalo to Detroit being made daily,"† furnishing at low rates excellent and comfortabe passage for the emigrant.

Not until 1830 did any considerable part of Michigan have more than two inhabitants to the square mile (Fig. 3). The population was in that year almost wholly confined to the southeastern corner, where it had spread out from the points of landing on Lake Erie. The only exception was in the St. Joseph valley, where the Carey Indian Mission, established upon the site of the city of Niles, became a center of expansion. This mission was established here in 1822 for the Pottawattomie Indians, the site being well within their territory and in easy river communication with Lake Michigan, by way of which their supplies came by boat.‡

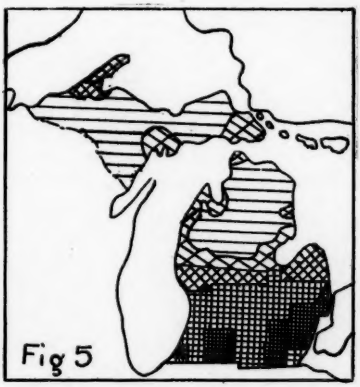
Detroit and Toledo Centers of Distribution. The influence of Detroit upon the distribution of population is apparent from Figure 3. At first the emigrant was intent on getting farther to "The West" and swept straight across the southern part of the peninsula.§ Michigan seems to have been a mere roadway to the states beyond it. It was in fact easier to go to Iowa than to the central part of Michigan through its giant forests. There were two principal wagon roads west from Detroit and one from Toledo. The Territorial and State Roads led from Detroit: the former through Ann Arbor, Jackson, Marshall and Mottville; the latter through Ypsilanti, Tecumseh and Jonesville.§ The road from Toledo passed through Adrian, Hillsdale and Sturgis, and met the Territorial Road at Mottville. The settlers arriving at Detroit or Toledo would follow one or the other of these routes. Many settlers traveling these highways were attracted by the "oak openings," changed their plans, and cast their lot with the Peninsular State. Hence the settlements did not reach far north of these routes, and as late as 1856 were "confined mostly to the openings, and to the intervening belts of timber,"§ while the

* T. M. Cooley: Michigan, p. 203. † Census of Michigan, 1904, Vol. 1, p. xviii.
‡ Isaac McCoy (the founder): History of Baptist Indian Missions, p. 118. G. S. Bailey: The Carey Indian Mission, p. 5. § Jacob Ferris: The Great West, p. 180.

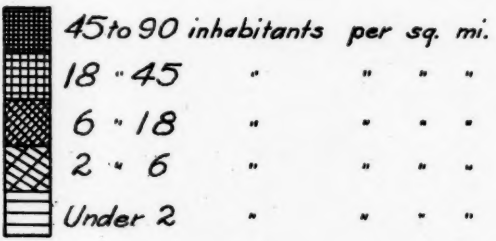
Distribution of Population
1810

Distribution of Population
1830

Distribution of Population
1850



Distribution of Population
1860



whole settled area extended not over 30 miles north of the Grand River. During the period 1820 to 1830, 22,743 people settled in the state, an increase of population of 256 per cent. over the preceding decade.

During the decade 1830 to 1840 the southern tiers of counties became well settled. The population of the state increased nearly 181,000, or 571 per cent. There was a continuous stream of immigrants overland, and every steamer crossing Lake Erie to Detroit was crowded.* Many new counties were organized. In 1836 Livingston, Genesee and Kent Counties were established. Immigrants were attracted to Livingston by the grist mill situated at Brighton, and reached it over the Grand River Road.† Kent was occupied largely by settlers who came by lake and river through Grand Haven, the gateway to Ottawa County (1837).† After 1833-4 development along the Grand River was made very largely through this port. Before then (1827) it had been a trading station for the American Fur Company. The next year (1837) Eaton, Shiawassee, Van Buren and Ionia Counties were organized. Various interests aided in advancing their settlement. The lime quarries in the southern part of Eaton were an early attraction, while the heavy timber in the northern part attracted lumbermen in 1835-6, and the manufacture of pot and pearl ash and saleratus hastened the clearing of the land.† The fertile farm lands of Shiawassee County were opened by the Dexter Colony, which in 1833 followed an Indian trail into the region. Ionia owes its settlement at the time to the Grand River Road, and Van Buren was settled by a northward movement from Cass from which it was detached.† Barry and Clinton were organized in 1839, completing the southern tiers at the close of the period.

Lumbering Becomes Important. The excessive speculation and "wild cat" banking schemes which prevailed in Michigan between 1830 and 1840, together with the financial disasters and business failures of 1837-8-9, checked the flow of immigrants for a time. This was counteracted in part by the crop failures and "hard times" of New England, which resulted in extensive emigration from that section. Between 1840 and 1850, however, 185,387 new settlers arrived, which was more than during any previous decade. This represented an increase of only 87 per cent. as compared with the 571 per cent. of the decade preceding. The area occupied in 1840 became more densely settled and was extended a short distance northward (Fig. 4). During this period lumbering assumed con-

*Census of Michigan, 1904, Vol. 1, p. xxi. †*Ibid.*, p. xx.

siderable importance. Sawmills multiplied at all accessible ports, and lumbering settlements grew up on all the branches of the Grand, St. Joseph and Saginaw Rivers.* The Grand Traverse region was off the regular route of immigration, and stories of its severe climate, the refusal of navigators to enter the bay until surveyed, the presence of a large Indian Reservation, and the granting of alternate townships as railway subsidy kept settlers away for some time. "Late in the forties a few pioneers, lured by the beauty of the scene, formed a little settlement at the head of the bay,"* which was the beginning of Traverse City.

Minerals Attract Settlers to Upper Peninsula. The settlement of the Upper Peninsula before 1840 was confined to the vicinity of the Sault. This region was looked upon as a wild waste, the resources of which were uncertain. In 1826 a large part of it was organized as Chippewa County, and in 1843 it was reorganized, but consisted of more territory than at the present time. By that time a few people had settled in Delta County, probably attracted by its lumbering and agricultural possibilities. Two years later Houghton County, including Marquette, Ontonagon and Keweenaw were organized. Most of this area had no agricultural value, but there were indications of mineral wealth. The copper and Marquette iron ranges were examined by the state geologist in 1843. The richest portion of the copper area extends through Keweenaw, and the easy access to the north caused miners to make this their headquarters (Fig. 4).† Veins of copper were plainly visible near Copper Harbor, and, in 1846, speculators flocked in. The discovery of iron deposits about Marquette opened a large area to rapid settlement. A mining company was started in 1849, but owing to poor transportation facilities no ore was shipped until 1856, the year after the Sault Canal was opened. By 1850 there were small isolated settlements in the Keweenaw-Marquette region, marking the location of valuable ores, and making a total population for the peninsula of "about 1600."‡

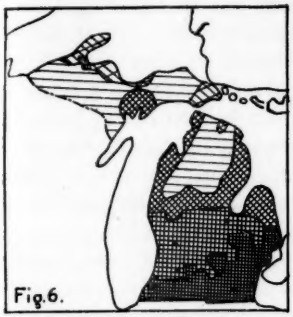
Forests Promote, Then Check Settlement. For the first ten years after 1850 the movement of the frontier in the Lower Peninsula was largely northward. The advance of lumbering along the lake shores extended the settled area to Traverse Bay and Au Sable, and Muskegon, Oceana, Mason, Manistee and Huron Counties were established. Several fishermen attracted to the Straits of

* Census of Michigan, 1904, Vol. 1, p. xxii.
† Census of Michigan, 1904, Vol. 1, p. xxiii.
‡ Peter White: Address at Semi-Centennial of Sault Canal, 1905, p. 21.

Mackinac remained and became permanent settlers after 1851. They started a village at Harbor Springs, on Little Traverse Bay, and in 1853 Emmet and Cheboygan Counties were organized. Up to 1850 the seclusion of Gratiot and Isabella Counties had caused them to remain a wilderness. In 1855 the price of land in these counties was reduced to 50 cents per acre for actual settlers. As a result there was a rush of immigration, and between 1854 and 1860 5,000 settled in Gratiot County alone, with no surplus provisions within 50 miles. From this situation it received the nickname Starvation Gratiot.

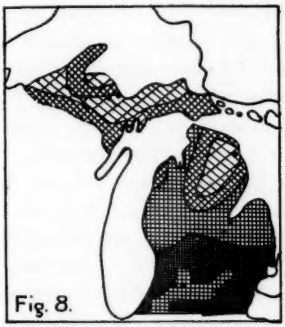
The dense forests and uninviting soil of the pine area in the northern half of the peninsula now acted as serious barriers, and for nearly 30 years (Figs. 5, 6, 7) the settlements were confined to or near the western, northern and eastern coast lines. With further development of the lumber business settlers penetrated into the interior from all sides. In this movement the many streams pointed the way and served as roads. During the first five years after 1860 the Civil War checked Michigan's growth. More than 90,000 of its men were in the army. By 1870, however, its population had increased 435,000, or 58 per cent. over 1860. At this time it stood at the head of the lumber producing states. In 1871 extensive lumbering operations were opened up in Roscommon, Gladwin and Clare Counties, and the same year the Counties of Lake, Missaukee, Kalkaska, Presque Isle and Clare were organized, and four years later Ogemaw, Roscommon and Gladwin. During the next three decades (1870-1900) the population of the state increased 104 per cent. It is evident from Figures 7, 8 and 9, that large numbers settled in the northern peninsula, many in the newer counties of the southern peninsula, and many in the denser settled areas farther south, especially in the cities. In 1900 only a small central area remained in the southern peninsula with six or less inhabitants to the square mile. During the next ten years (1910) the counties of this portion of the peninsula, except two, increased in population from 12 to 5,200 each (Fig. 12). At the same time Michigan lost nearly all its stately pines, there remaining over part of the interior only a barren, desolate waste of fire-blackened stumps on a sandy plain, overgrown in places by briars and the scrubby jackpine.

Mines and Lumber Dominate the Upper Peninsula. From 1850 to 1860 the population of the Upper Peninsula increased 807 per cent., 6 per cent. of which was in Delta and 8 per cent. in Chippewa County and the remainder (793) in the mining districts. The lumbering interests of Delta had attracted about 1,200 settlers, the



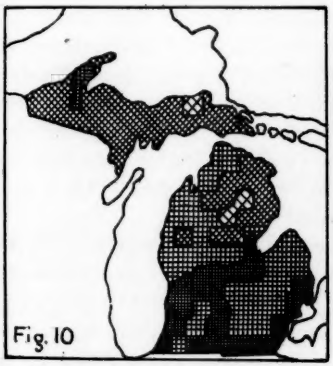
Distribution of Population
1870

Distribution of Population
1880

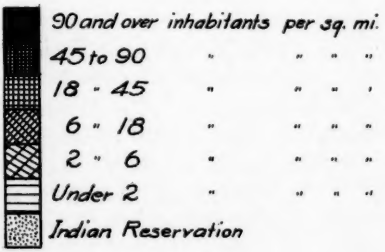


Distribution of Population
1890

Distribution of Population
1900



Distribution of Population
1910



river and lake facilities being especially favorable. People realized that vast wealth was to be had in the copper and iron mines, if the handicap of the Saint Marys rapids could be overcome. This was especially true of iron, copper being so valuable that it could stand the land haul.* All Lake Superior shipments had to be portaged around the rapids and the cost was prohibitive. In 1850 the cost of blooms after they had been taken from Marquette to Pittsburg was $200 per ton, and the market price was then $80, leaving a net loss per ton of $120.†

The opening of the Sault Canal in 1855 gave a great impetus to the iron industry by the cheap transportation thus assured, and hence to the settlement of the region. Its limited draft of 12 feet, accommodating boats of about 400 tons, was soon found inadequate and it was enlarged and deepened to 16 feet in 1881 and to 21 feet in 1896. By 1866 the rates on iron ore from Lake Superior to Lake Erie ports had decreased to $3.00 per ton,‡ by 1895 to 82 cents, and by 1906 to 67 cents.§ The influence of the canal upon the development of the Upper Peninsula can scarcely be overestimated. The rapid increase in population around the shores of Lake Superior may fairly be ascribed to it. From 1860 to 1870 population of the counties bordering the lake increased 116 per cent., from 1870 to 1880, 39 per cent., and from 1880 to 1900, 172 per cent. This gain was especially marked in the copper and iron mining counties. Houghton and Marquette alone gained 35,100 between 1860 and 1880, and 59,500 in the 20 years following. The lasting influence of the mines is evident from Figure 11, which shows the population increase for the last decade (1900-1910). The population of Houghton County increased 22,000, and that of Gogebic, Iron, Delta and Marquette from 5,500 to 6,600 each. Delta is not a mining county, but it contains Escanaba, the largest city in the Upper Peninsula, which is the most important iron shipping port on Lake Michigan. This city has increased its population by over 3,500 in the last ten years, while its neighboring lumber city, Menominee, has decreased over 2,000. In the eastern counties lumbering and agriculture dominate, and the increase varied from 790 to 3,100 each. The largest increase was in the city of Sault Ste. Marie.

The railroads and lumbering were also of importance in settling the region. Schoolcraft County, for example, was organized in

*Sen. Doc. 20, 58th Cong., 1st Sess., Vol. 3.

†R. D. Williams: The Hon. Peter White: A Biographical Sketch of the Lake Superior Iron Industry, p. 59.

‡*Ibid.*, p. 164.

§Chas. Davis: Statistical Report of Lake Commerce, 1906, p. 13.

1871, and although having an abundance of timber and rich agricultural lands, it remained a wilderness until the Detroit, Marquette and Mackinac Railroad passed through it.* Many of the railroads were built to secure the lumber traffic, and opened the country to settlement. Together with the flourishing copper cities of Calumet and Houghton and the thriving iron cities of Marquette and Ishpeming, grew up the lumber cities of Escanaba and Menominee.

The mining of copper and iron, the Sault Canal, and the lumbering industry have been the vital factors in the settlement of northern Michigan. Limited agriculture could have been carried on in the western part where the mantle of drift lay collected in the valleys and lowlands, or in the less rugged eastern part. It has always been, however, a minor factor in the settlement of this region. Mining has been and is to-day the dominating factor in the distribution and occupation of the people. Forests as a natural resource are second in importance. The opening of the Sault Canal and its subsequent enlargement wielded an enormous influence in the development of the region. It was the "connecting link" with the markets of the world, and without it the progress of the region must have been slow indeed.

Present Distribution of Population

Development During the Decade 1900 to 1910. The last decade of Michigan's development presents three phases: (1) general distribution, (2) changes within the state, and (3) urban versus rural population. The general distribution of population for 1910 is similar to that for 1900. Maps for both years (Figs. 9, 10) show three parallel segments of population extending across the southern half of the Lower Peninsula, the inner being less densely settled than the two outer. The inner segment corresponds closely with the hilly terminal moraine belt which is continued northward along the western border of the peninsula. The denser area at the north follows the outlet of the glacial Lake Saginaw and has a level to gently rolling topography and rich sandy to clay loam soil. Industrial development and intensive farming have progressed rapidly in this region. The dense area on the southeast always has had Detroit, Toledo and several smaller cities as easily accessible markets for truck and other farm products, thus encouraging intensive farming and a dense population. Nevertheless the attraction of the large cities has been sufficient to produce an absolute decrease in most of the counties of this area (Fig. 12).

* Census of Michigan, 1904, Vol. 1, p. xxv.

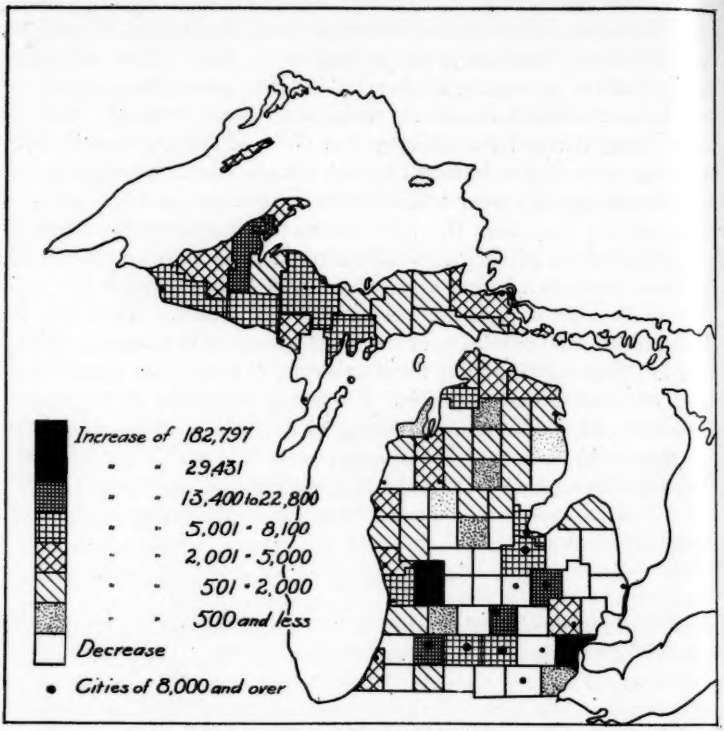


FIG. 11—Increase of Population, 1900 to 1910.

Change in Distribution. Sixty-nine per cent. of the counties show an increase in population in 1910 (Fig. 11). The older southern half of the state is characterized by an increase in the counties having large cities, with the largest increase accompanying the largest cities. The line of counties of increase from Detroit to Saginaw, with counties on both sides which show a decrease, is a prominent feature. These counties have excellent interurban electric as well as steam transportation. Industrial development has been rapid, and the people appear to have been drawn in from all sides. Flint, occupying a central position in the line, nearly trebled its population in the decade, and Lansing, just southwest of it, nearly doubled. The automobile and allied industries of these two cities have grown rapidly and offered employment to thousands. Detroit, Grand Rapids, Kalamazoo, Battle Creek and Jackson have likewise enjoyed rapid industrial growth creating a demand for thousands

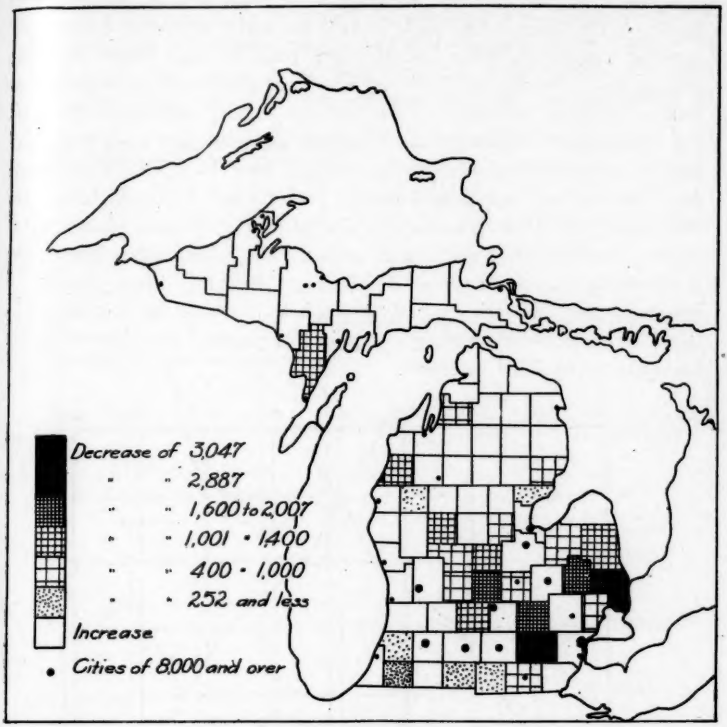


FIG. 12—Decrease of Population, 1900 to 1910.

of new laborers. The drain upon the surrounding country is evident.

The widespread increase in the Upper Peninsula and in the northern part of the Lower Peninsula is an important change. Large portions of these counties are still forested, other parts are very sandy and unfit for agriculture and some are too rugged for that purpose. Though considerable areas have been opened to settlement and considerably advertised in the past ten years, many of the counties have only a few thousand acres of improved land at present. They represent the new land of the state, and the tendency to abandon the old farm for a new and larger one is well shown, as many farmers have moved from the older southern counties to this region. The decline of lumber manufacturing in the area has also tended to increase the rural and decrease the city and village population.

Nearly all the counties showing a decrease are in the southern third of the state (Fig. 12). Only six have cities of 8,000, and without exception those counties are near to, and have excellent steam and electric railroad or water communication with those cities. In other words it is the old and strictly rural counties that are losing their inhabitants. Washtenaw County is a striking example, with thriving cities both east and west of it and with steam and electric railroad connections. Hundreds of people have left this county for Detroit and other nearby cities. This is equally true of the counties lying north and south of it. Menominee illustrates a declining lumber county which, thus far, has been unable to develop other industries rapidly enough to maintain its former position. Extensive advertising to regain lost prestige has been recently inaugurated by local interests.

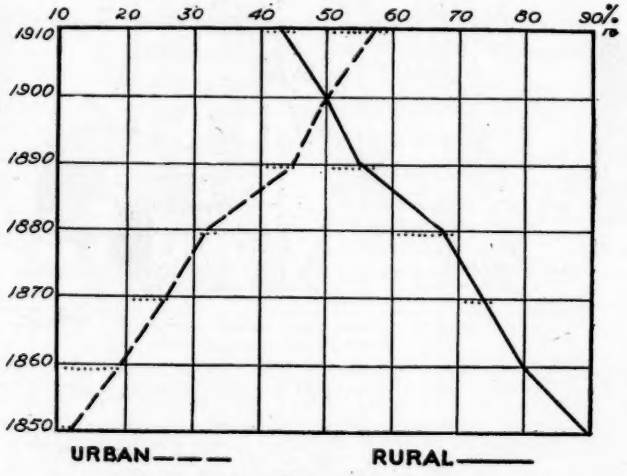


FIG. 13—Growth of Urban and Rural Population.

Rural versus Urban Population. The last century has witnessed a revolution in the relation of rural to urban* population (Fig. 13). In 1850 89 per cent. of the population lived in the country. Fifty years later rural and urban were equally divided, but by 1910 the rural population had decreased to 43 per cent. If the population of unincorporated villages, not farmers, was deducted this percentage would be still smaller. This movement toward the city has not been checked. Michigan has nine cities of 25,000 and over which ab-

* In this discussion all incorporated cities and villages are considered urban and the remainder rural.

sorbed 77 per cent. of the total increase for the last decade. All cities of 5,000 and over increased 44 per cent. and included 95 per cent. of the total increase, while cities and villages of less than 5,000 increased 8 per cent. It is, therefore, the larger places that are increasing most rapidly. Yet the tendency of manufacturers to

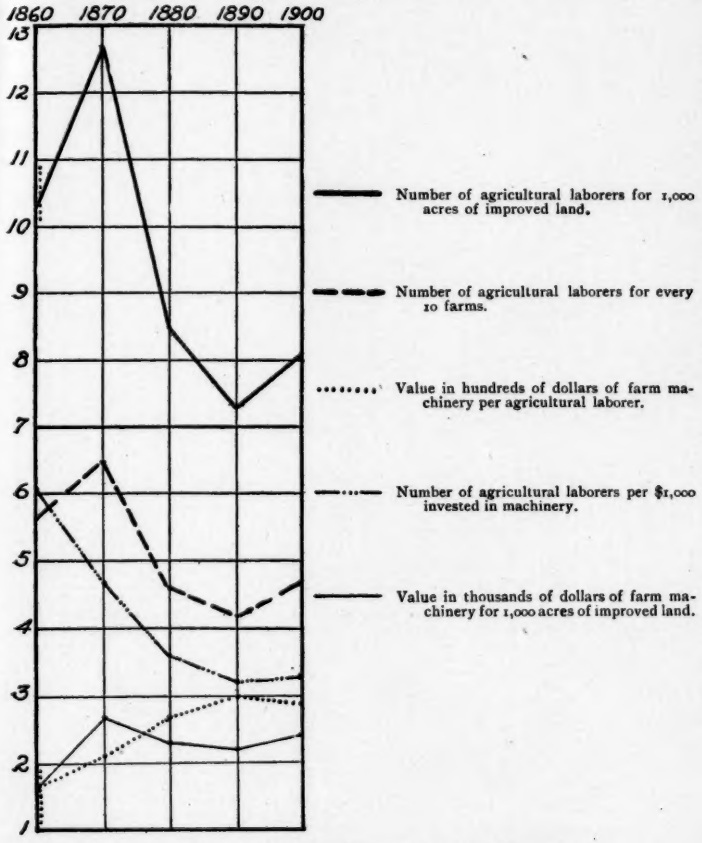


FIG. 14—Relation of Farm Machinery to Agricultural Laborers.

seek smaller towns to avoid labor troubles and excessive taxation is shown by the substantial growth of many places of moderate size. This is further emphasized by the fact that the total urban population increased 2.4 per cent. more than did the entire state, *i. e.* it equalled 102.4 per cent. of the total increase. This extraordinary

city-ward movement has been accompanied by an *absolute loss* in rural population of nearly 10,000, or 0.8 per cent.

The cause of this movement to the cities is both economic and social. Under the system of extensive farming the efficiency of farm labor was multiplied many times by the introduction and increased use of machinery. In 1870 there were about 13 farm laborers for 1000 acres of improved land. This decreased to seven in 1890 and increased again to eight in 1900. There are many difficulties in determining the exact relation between agricultural laborers and farm machinery, but the agreement shown in the five methods used is significant (Fig. 14). Whether the increase of 1900 is to be permanent cannot be told with certainty. The figures indicate that (1) the increase in intensive farming is giving employment to more people, or that (2) the ultimate effect of farm machinery will be an extension of agriculture and an increase in the number of agricultural laborers corresponding to the introduction and use of machinery in manufacturing industries. At the present time there is a large demand for farm laborers, but, to the energetic young man seeking rapid advancement, relatively low wages and long hours act as deterrents. Unless far more general adoption of intensive farming occurs with better financial returns, this movement from country to city apparently must continue. The city offers definite working hours and educational and social advantages that the country cannot. Its schools, libraries, churches, amusement parks and theaters appeal to the young man and woman from the farm as never before. The telephone, free mail delivery, rural high schools, libraries, and the general agricultural prosperity of recent years has not, as yet, been effective in checking the movement. It is obvious that the curves shown in Figure 14 cannot continue indefinitely at the present rate of increase, but there is no indication of the time when they will become parallel lines.

Distribution of Rural Population. The distribution of the decreasing rural population and some of the factors influencing it should be considered. Its close relation to intensive farming and size of farms is shown by Figures 15 and 16. One is almost the counterpart of the other. Houghton County has the highest density per square mile. If unincorporated villages were reported separately by the census this density would be reduced, as the county has about twenty such villages in which large numbers of the miners live.* In addition to this the rural population is principally Fin-

* Personal letter from William Bath, Commissioner of Schools for Houghton County.

nish, with an average family of seven.* They practice intensive agriculture, on the limited area of improved land, for the local market.*

Perhaps the most conspicuous feature is the dense area extending from Saginaw Bay to the southwestern corner of the state. The average size of farms varies from 64 to 84 acres. In the east the soils are clay and sandy loams deposited in the glacial Lake Sagi-

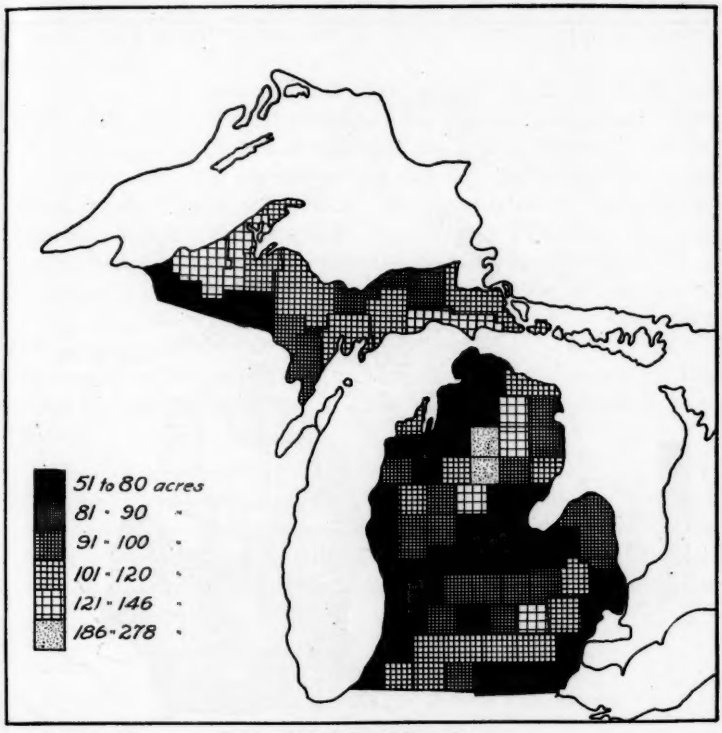


FIG. 15—Average Size of Farms in 1904.

naw, and suited to the sugar beet, truck gardening and other intensive crops. Large cities with a manufacturing population and excellent transportation give a constant market. In the west and southwest a sandy soil, moderated lake climate, a growing summer resort business, efficient rail and lake shipping facilities to large city markets, have been effective in bringing truck gardening and fruit

* Personal letter from William Bath, Commissioner of Schools for Houghton County.

growing to a high state of perfection. The fruit growing industry has spread north along the lake and is chiefly responsible for the relatively dense population found there.

The dense area along the southeastern border is nearly flat with sandy and clay loam soils formed in the glacial Lakes Whittlesey and Warren. It is covered by a network of steam and electric railroads, supplemented by steamboat service on Lakes Erie and St.

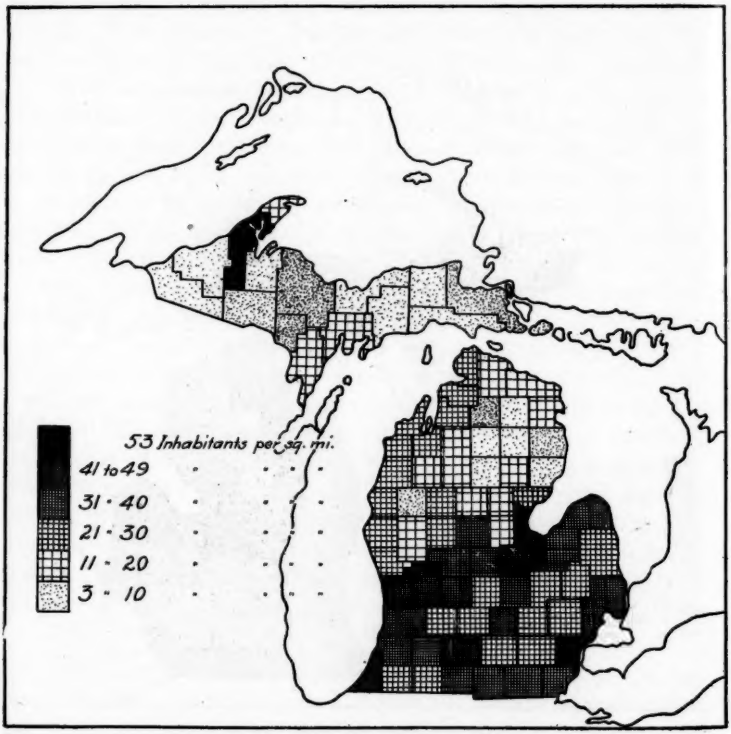


FIG. 16—Distribution of Rural Population in 1910.

Clair and the Detroit River. Cities like Detroit, Toledo and Port Huron constitute a market for agricultural and dairy products equaled in few other parts of the state. The average-sized farm is 82 acres (Fig. 15), and intensive agriculture prevails. The higher density of Wayne County is due in part to the large suburban population made possible by the interurban electric lines radiating from Detroit.

The belt of relatively less density lying between the central lowland and Detroit areas is a terminal and ground moraine country. Its topography varies from gently to sharply rolling, and its soil from stiff glacial clay to sand. The average-sized farm exceeds 100 acres, and much less intensive farming prevails than in the adjoining areas. There is a strong tendency to cling to the old crops, yet less dependence on a single crop has developed. In recent years stock feeding on the farm crop and the dairy industry have made considerable progress, but there is splendid opportunity for further development.

The northern areas of small density represent the relatively new land of the state. Forests still exist over portions of them. Thousands of acres in the western part of the Upper Peninsula are too rugged to support a population that tills the soil, but pasturage and forestry offer future possibilities. The eastern half of the peninsula together with the northern half of the Lower Peninsula are better suited to agriculture, and an increase in the rural population may be expected. Part of the central portion of the latter region is very sandy and when burned over becomes a region of drifting dunes wholly unfit for anything but scientific forestry. These areas will ultimately be eliminated from settlement, the good agricultural land used for that purpose, and a dense rural population will be supported.

Sources of Population. Nearly all the states and many foreign countries have contributed to Michigan's population. The chief contributors among American states have been the New England States, New York, New Jersey, Pennsylvania and Ohio, and among foreign countries, the British Isles, British America, Germany and

NATIVITY OF POPULATION IN 1850.

STATES	NUMBER	PER CENT. OF TOTAL POPULATION	COUNTRY	NUMBER	PER CENT. OF TOTAL POPULATION
Vermont	11,113		Ireland	13,430	
Massachusetts	8,107		England	10,620	
Connecticut	6,751		Scotland	2,361	
New Hampshire	2,744		Wales	127	
Maine	1,117		British Isles	26,538	6.6
Rhode Island	1,031				
New England	30,923	7.7	British America	14,008	
			Germany	10,070	
New York	133,756	33.6	Holland	2,542	
Ohio	14,677				
Pennsylvania	9,452				
New Jersey	5,972				
Total	163,457	41.1			
Total	194,380	48.8		53,158	

Holland. By 1850 New England had sent 30,900, or about 8 per cent. of the total, and New York 133,800, or 67 per cent. of those coming from the United States, and 34 per cent. of Michigan's entire population. Ohio had furnished 14,700 and New Jersey and Pennsylvania combined about 15,000. At the same time Michigan had a foreign population of 54,852, 97 per cent. of which came from the countries mentioned above. Ireland and England sent 24,000 and Germany 10,000. In more recent times the native population has been increasing and the foreign decreasing. In 1880 76 per cent. of the inhabitants were native-born and 24 per cent. foreign-born, while in 1904 the former element comprised 78 per cent and the latter 22 per cent. of the total. The foreign element is unequally distributed throughout the state. The Upper Peninsula, especially the mining counties, has the highest percentage of any section. This is the only section of the state showing an increase in the foreign population. It has 20 per cent. of the total foreign-born, showing an increase in the decade 1894 to 1904 of 11,773, or 12 per cent. Although the actual number of foreign-born in this section has increased, the ratio to total population has decreased in the same period. The foreign element show a tendency to concentrate in the cities. In 1904 the cities of the state had a population of 1,036,249, 27 per cent. of which was foreign-born, while the villages and rural districts had a foreign population of 17 and 19 per cent. respectively. The cities contained more than two-fifths (40.9%) of the total population, and over one-half (50.6%) of all the foreign-born.

There were two principal economic reasons for emigrants seeking new homes in Michigan. "In New England there was a never ceasing desire 'to see how things went in other parts'; a desire to find a land that offered better advantages for accumulating wealth than was found at home."* By 1830 all the available lands had been taken up and hillside farming had begun, especially in Vermont. The young men who found it difficult to support themselves on 100 acres or less, turned to the free land of the West.† The crisis of 1837 and crop failures the same year brought them economic distress and increased the number migrating. As late as 1850 the average price of New England farm land was $26.43, while in Michigan it was but $14.32, and good Government land could be had for $1.25 and $2.50 per acre. At the same time New York land was bringing $34.00, New Jersey land $49.16, Pennsylvania land $31.10, and Ohio land $23.09, on the average. Not until

* W. V. Pooley: Settlement of Illinois, 1830–1850, p. 335. † *Ibid.*, p. 336.

sometime between 1860 and 1870 did the average price of Michigan land equal and exceed that of New England, while at no time has it equaled the price in the other states named. In addition to the difference in the price of land, the migration from Ohio un-

FARM-LAND VALUES FROM 1850 TO 1900.

STATES	1850	1860	1870	1880	1890	1900
Connecticut	$34.43	$41.72	$49.07	$55.10	$47.95	$49.01
Maine	14.68	17.01	17.97	18.89	19.80	19.43
Massachusetts	36.33	41.90	40.58	48.91	49.25	58.04
New Hampshire	19.58	22.24	22.03	23 84	23.19	23.78
Rhode Island	34.48	42.55	40.61	56.41	53.66	19.24
Vermont	19.09	26.72	29.77	26.79	23.16	22.96
New England	26.43	32.02	33.33	38 32	32.63	38.74
New York	34.01	44.64	53.89	51.16	51.88	47.23
New Jersey	49.16	67.75	76.76	72.59	68.54	66.71
Pennsylvania	31 10	44.33	53.12	55.35	57.88	54.29
Ohio	23.09	37.91	44.23	51.44	51.20	48.93
MICHIGAN	14.32	27.08	36.87	41.59	43.82	39 31

doubtedly represents a recognition of the shipping advantages of lakes over rivers. For a number of years previous to 1840 the staple exports—wheat and flour—found their best markets at lake towns rather than at river towns* For this reason the farmer wanted his farm as near lake navigation as possible, and therefore he moved from the river to the lake region and to a state where land was cheap.†

To the foreign immigrants Michigan offered cheap lands, equal opportunity and social equality, things denied them at home. In later years it offered work in its lumber camps, mines and mills, and it was easily accessible from Europe by way of New York and Quebec at a minimum expense of time and money.

The tide of emigration from New England began between 1830 and 1837. Probably no other settlers have wielded so potent an influence in the affairs of Michigan. This influence first became apparent when Winthrop Sargent of Gloucester, Massachusetts, became first governor in 1795. Other early governors were William Hull of Connecticut (1805) and Lewis Cass of New Hampshire. The latter held the office for 16 years beginning in 1813. Every New England state has furnished a governor for Michigan, while all except Connecticut have supplied a superintendent of public instruction. For 66 years these two offices have been filled by New Englanders. In 1878 a volume was published entitled "Representative Men of Michigan," containing sketches of 1,158 of the more prominent men of the state; 288 of these were native New

* J. W. Scott in *Hunts Merchant Mag.*, Vol. 9, p. 37. † *Ibid.*

Englanders and 182 sons of New Englanders. These two classes comprised 40 per cent. of the representative men.

When Michigan completes (1) its crop adjustment to soil, climate, and market, and (2) its transportation facilities, it will have secured the maximum agricultural value of its geographical and geological advantages. Its population will then assume a more permanently stable character, similar to that which now characterizes the older European states. This process is well under way, and, though it works slowly, the ultimate results are certain.

PROFESSOR BOWMAN'S EXPEDITION TO THE CENTRAL ANDES

In the period from April to October, 1913, Professor Isaiah Bowman of Yale University will conduct a South American expedition under the auspices of the American Geographical Society of New York. The field of investigation is that part of the Central Andes lying in northwestern Argentina and adjacent portions of northern Chile and southwestern Bolivia. The accompanying map shows the field of Professor Bowman's work, the route he proposes to follow and the routes of his two earlier journeys.

Professor Bowman conducted the Yale South American Expedition of 1907 to northern Chile and Bolivia and was the geographer-geologist of the Yale Peruvian Expedition of 1911. In the first expedition he explored portions of the desert of Atacama and the Maritime Andes, traced the shorelines of the ancient lake on the Bolivian tableland, and descended the Chaparé valley northeast of Cochabamba as far as the border of the Amazonian lowlands. In 1911 he descended the Urubamba between Rosalina and Pongo de Mainique by canoe and surveyed the great bend of that river, again entering the lowlands of the Amazon basin. This journey was recently reported in an article by Professor Bowman entitled "The Cañon of the Urubamba," which appeared in the *Bulletin* (Vol. 44, 1912, pp. 881-897). Later in the year he conducted the geographical and topographical division of the expedition across the Maritime Andes to the coast at Camaná, traversed the coastal desert to Mollendo, and made additional studies on Lake Titicaca and the Desaguadero R. Papers and reports on the two earlier expeditions have been published in the *Bulletin of the American Geographical Society,*

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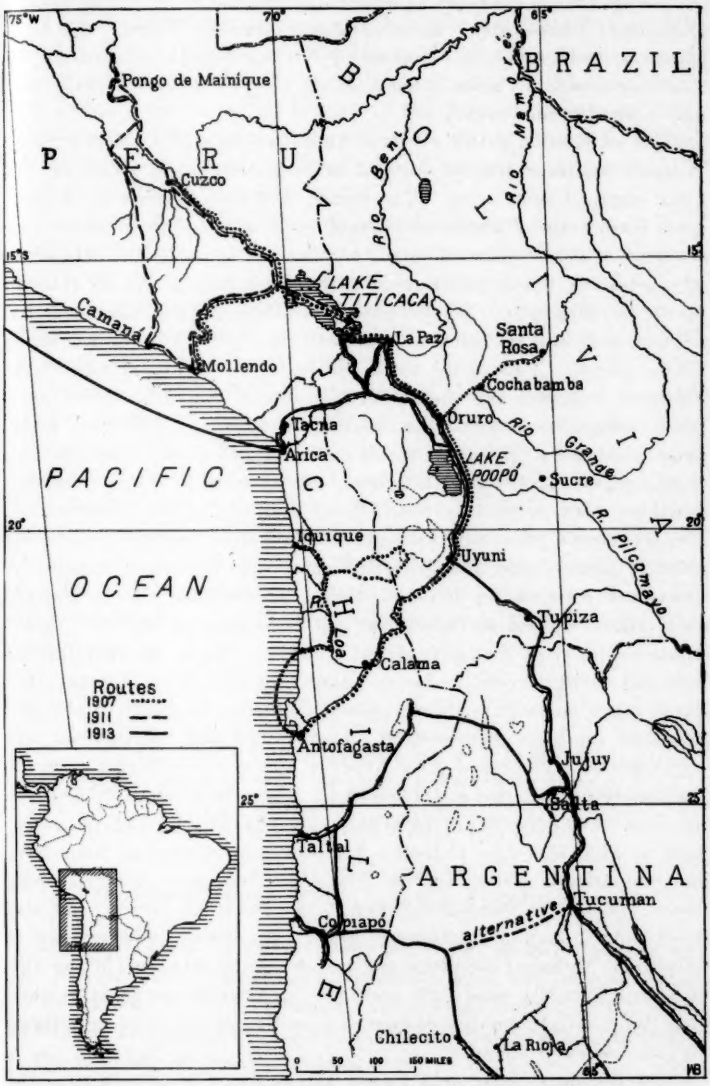


Route of Professor Bowman's Expedition to the Central Andes, 1913; also the routes he followed in 1907 and 1911. Scale 1:13,500,000.

the *Geographical Journal* (London), the *Bulletin of the Geographical Society of Philadelphia*, the *American Journal of Science*, the *Educational Bi-Monthly*, the *Journal of Geography*, the *Zeitschrift für Gletscherkunde* (Vienna), the *Scottish Geographical Magazine*, and the *Yale Alumni Weekly*.

The expedition to the Central Andes will enable Professor Bowman to complete certain lines of investigation upon which he has been engaged since 1907. The results will be published in preliminary form in this *Bulletin* and in final form in a volume entitled "The Central Andes." The subjects of study in the projected field work are primarily the anthropogeography of the region and its relation to the physiography. The investigation of topography, drainage, and climate will thus go hand in hand with the distribution and customs of the people. Part of the work will lie in the driest portions of the Puna of Atacama and the adjacent desert of Atacama where piedmont villages in isolated situations, vast salt plains and lofty tablelands alternate with rugged volcanic masses and snow-capped sierras. It is a region as yet but little known, and some of the most interesting portions have never been studied scientifically. The climatic conditions are of great interest, and the possibility exists of securing critical data on past changes of climate since the region lies in the transition zone of the horse latitudes, between the trades and the westerlies. Added to this is the fact that some of the old historic trade routes cross this lofty desert country. When the Antofagasta railroad extended only as far as Calama (northeast of Antofagasta) mule trains in large numbers passed from the terminus of the line east and south to northwestern Argentina. Later the railroad was extended to Uyuni, and great impetus was given to traffic over the Tarija route to Jujuy and Tucuman. For a time even some of the imports of northwestern Argentina came by way of Cobija, a seaport in what was then Bolivia. These shifting routes of trade have had remarkable effects on the towns and villages scattered along them, not only in stimulating them to an unnatural degree, but also in causing sudden and unnatural decay. An attempt will be made to cross the Andean Cordillera and the desert of Atacama along two different parallels where the contrasts in altitude are most marked and thus to study the distribution of people under extreme conditions of physical environment.

The last part of the field season will be spent in investigating the border of the Titicaca basin and descending the Desaguadero River as far as possible toward Lake Poopó. The elevation of the ancient strand-lines of Lake Minchin, the ancient lake that once occupied a

part of the Bolivian alti-plano, or high plateau, will be determined. The relations between this now vanished lake and Lake Titicaca have never been investigated, and the key to the problem must be sought in the outlet of the Titicaca basin. There, also, must be sought the key to much of the earlier history of the Titicaca depression. The Tiahuanaco valley and its celebrated ruins will be studied in relation to the supposed ancient levels of Lake Titicaca and to the limits of food production in the valley to-day.

The expedition will sail for Buenos Aires via Southampton, England, leaving New York on April 26, on the *Oceanic* of the White Star Line. Professor Bowman will be accompanied by Mr. H. S. Palmer, a graduate student in the Department of Geological Sciences at Yale, and for a part of the time also by a surveyor to be employed in South America.

Professor Bowman's field researches in South America have contributed materially to our knowledge of the topography, the fluvial systems and the climatic conditions of the desert, mountain and plateau regions he has traversed; and the emphasis he always places upon the importance of studying the interrelations between man and his environment has added richly to his results. It was highly desirable that Professor Bowman should have an opportunity to complete his work in the part of South America which he will now revisit, and the American Geographical Society is glad to further this consummation.

THE SEVENTEENTH GENERAL CONFERENCE OF THE INTERNATIONAL GEODETIC ASSOCIATION

By WILLIAM BOWIE
Inspector of Geodetic Work, U. S. Coast and Geodetic Survey

The International Geodetic Association met in conference in the City of Hamburg, Germany, in September, 1912, the delegates being guests of the State of Hamburg. This conference was especially interesting and important, as it was held on the fiftieth anniversary of the founding of the Association.

A formal session opened the conference, with the President of the Association, General Bassot, in the chair. Senator Dr. von Melle of the State of Hamburg delivered the address of welcome, which

was responded to by the President. Among the other addresses were those by the Secretary of the Association, Prof. Dr. van de Sande Bakhuyzen, and the Director of the Central Bureau of the Association, Prof. Dr. Helmert, who reviewed the history and work of the International Geodetic Association during its first fifty years. The meetings were held in one of the rooms of the Vorlesungsgebäude.

At the sessions from the 18th to the 27th, when the conference adjourned, reports were presented by the standing committees on the different branches of geodetic work and research and by the delegates representing the twenty nations which took part in the conference. These nations were Austria, Belgium, Chile, Denmark, France, Germany, Great Britain, Greece, Hungary, Italy, Japan, Mexico, Netherlands, Norway, Rumania, Russia, Spain, Sweden, Switzerland, and the United States of America. The delegates from the United States were Mr. O. H. Tittmann, Superintendent of the U. S. Coast and Geodetic Survey, and the writer.

The reports covered the progress made during the past three years since the Sixteenth General Conference, held in England in 1909.

Of special interest to the geodesist and geographer in the United States are the reports of work done in Mexico and in this country, although there was much of interest reported by the delegates of the other nations and by the standing committees of the Association, notably that on the variation of latitudes. All of these reports will be printed in full in the *Proceedings* of the conference.

Mexico has extended a primary triangulation from the Pacific Ocean to the Rio Grande along the 98th meridian, an arc of about ten degrees. Parties of the U. S. Coast and Geodetic Survey are now in the field in Texas, where they will make a connection between this Mexican arc and the completed arc of primary triangulation which extends along the 98th meridian in the United States from Alice, Texas, to the Canadian border. This United States arc is twenty-three degrees in length. When the arcs of the two countries are connected there will be a meridian arc of 33°, or 2,270 statute miles, the longest meridional arc of primary triangulation in the world.

A gravity base station has been established in Mexico from which a gravity survey will be made by the Mexican Geodetic Commission.

The report on the work in the United States, entitled "Geodetic Operations in the United States, 1909-12," was presented by Mr. Tittmann. Extracts from it are given below which show the pro-

gress made in this country in the different branches of geodesy. At the end of that report is given a list of the geodetic publications issued by the U. S. Coast and Geodetic Survey during the years covered.

Astronomy. The astronomical work consisted of twenty-five azimuths observed at stations of the Texas-California arc of primary triangulation and of the secondary triangulation in Washington state, one latitude station and seven longitude stations.

Triangulation and Base Measurements. The Texas-California arc, extending from a line of the 98th meridian arc in central Texas to a line of the Pacific Coast triangulation in southern California, was begun in November, 1908, and was completed in February, 1911.* This arc is 1,207 miles in length; the main scheme covers an area of 49,220 square miles; and 115 stations were occupied for angle measurements. This arc is of great geographic value as it coordinates a number of previously existing separate schemes of triangulation, including several along the international boundery between the United States and Mexico, and furnishes bases from which to extend other schemes for controlling topographic and other surveys.

A scheme of secondary triangulation was extended from the vicinity of Tacoma, Washington, to the Pacific Coast near Grays Harbor, and thence southward to the mouth of the Columbia River. The length of this scheme is 140 miles.

The Alaska and Canada Boundary Survey under the direction of Dr. W. F. King, representative for Great Britain, and Mr. O. H. Tittmann, representative for the United States, as commissioners, extended a triangulation 512 miles along the 141st meridian, the boundary between Alaska and Canada. (During the season of 1912 this triangulation was completed to the Arctic Ocean). By the end of the year 1911 the triangulation along the 49th parallel of latitude had been extended 1154 miles from the Pacific Coast, along the United States and Canada boundary, to the Red River. These two arcs of triangulation are not primary in character but their results are of much value for geodetic and geographic purposes. The Lake Survey, under the Corps of Engineers of the United States Army, added 125 miles to the primary triangulation of the Great Lakes.

Two primary bases were measured to control the Texas-California triangulation and several tertiary bases were measured on the 141st meridian and the 49th parallel triangulations.

Reconnaissance for Primary Triangulation. During the year

* Summarized in *Bull. Amer. Geogr. Soc.*, Vol. 43, 1911, pp. 447–448.

1911 and the first two months of 1912, 1,277 miles of reconnaissance (selection of stations) were made for triangulation along the 104th meridian to the north of Denver, Colo.; from Salt Lake, Utah, to Needles, Cal.; and from Huntsville, Ala., to Memphis, Tenn.

*Extension of U. S. Standard Datum.** Arcs of triangulation, 2,500 miles in extent, were computed in the Coast and Geodetic Survey office during the three years covered by the report, and placed on the standard datum. Maps showing the results of surveys controlled by triangulation on the standard datum should never need changes in the projection (the lines showing the arcs of the meridians and parallels of latitudes).

Precise Leveling. During the three years, 1909 to 1911, 2,148 miles of leveling of the highest order were added to the leveling net of the United States by the Coast and Geodetic Survey and 300 miles by other organizations.

A readjustment of the precise leveling net of the United States is now being made by the Coast and Geodetic Survey and it is expected that the resulting elevations will be held as *standard* for all surveying and engineering purposes.

Gravity. In the years 1909-1911, the intensity of gravity was observed at seventy-seven stations in the United States; these with the forty-seven old stations make one hundred and twenty-four in all. They are fairly well distributed over the entire country. At each of these stations the observations were made with the half-second pendulum apparatus, using the station at the Coast and Geodetic Survey as the base. That station had been connected with the station at Potsdam, Germany, where the absolute gravity has been determined by observations through a long series of years.

Geodetic Investigations. In 1909, Prof. J. F. Hayford, then Inspector of Geodetic Work in the Coast and Geodetic Survey, completed his two reports on the figure of the earth, which were published in that year. They were reported to the 1909 conference of the International Geodetic Association held at Cambridge and London. In his investigations he applied the theory of isostasy, which postulates that the earth's crust is in a state of approximate equilibrium and that each topographic feature above sea level is floated, so to speak, by a deficiency of mass in the earth's crust, which exactly balances the mass above sea level. Likewise, under the oceans,

* For a detailed explanation of this datum see pp. 65 to 68 of Coast and Geodetic Survey Special Publication No. 11, or other reports of the Coast and Geodetic Survey, which give the results of triangulation.

there is assumed to be an excess of mass which exactly balances the deficiency of mass in the oceans. The station errors, or deflections of the vertical, at the several hundred astronomical stations, which were also triangulation stations, were very greatly reduced by considering the deficiency and excess of mass, which is called the isostatic compensation. It was found that the most probable depth to which these compensating masses extend is about 122 kilometers (seventy-six miles). The shape and size of the earth as derived by Hayford from data only in the United States have a greater precision than previously determined values from deflections of the vertical in this or other countries.

Previous to the conference in 1909 Professor Hayford developed a new method of reducing gravity observations in which the theory of isostasy was considered. By this method the intensity of gravity at a station is corrected for the attraction at the station, of the topography of the whole earth and its isostatic compensation. At the meeting of the Association in 1909 he presented a preliminary report on his method and the results he had obtained in reducing fifty-six gravity stations in the United States and sixteen stations not in the United States.

In the preparation of the final report on the new method of gravity reduction and the results of eighty-nine stations in the United States, Professor Hayford had the writer associated with him, and they appeared as co-authors of the report. This report appeared early in 1912 as "Effect of Topography and Isostatic Compensation upon the Intensity of Gravity."*

A report on a supplementary gravity investigation was prepared by the writer, copies of which were presented to the delegates at the Hamburg conference. In this investigation all of the stations in the United States, 124 in number, were used. The most remarkable feature of this supplementary investigation is the deduction of the flattening of the earth, first, from all of the stations in the United States as one group, then, in two groups of stations, one in the eastern portion of the country and one in the western. The three derived values of the reciprocal of the flattening are, respectively, 298.4, 297.8 and 299.6. The remarkably close agreement of all these values of the flattening, from very few data and a small range in latitude, with the generally accepted best values depending upon extensive geodetic data, makes it appear that the new method of reduction is very close to the truth.

* *Special Publication No. 10* of the Coast and Geodetic Survey.

In his report to the conference, Mr. Tittmann made the statement: "It is hoped that the International Geodetic Association in the near future may reduce all the available gravity stations of the world by this method, for it is reasonably certain that a value of very great precision for the flattening could be deduced from the results."

Photographic Zenith Tube. A section of Mr. Tittmann's report was devoted to a description of this tube and the method of using it at the International Latitude Station at Gaitersburg, Maryland, by Dr. F. E. Ross. The object in view in designing and operating the photographic zenith tube for the determination of latitude was twofold: (a) increased precision in the latitude observations; (b) comparison of final results with results secured by the visual zenith telescope placed alongside and operated simultaneously with it, with special reference to the variation of the latitude curve, in the Kimura term, the aberration constant, and the so-called night error. The second object was considered to be of more importance than the first. In its main features and its general theory the instrument is a photographic adaptation of the Greenwich zenith tube designed by Sir George B. Airy (Greenwich Observations, 1854).

The instrument was mounted in May 1911 and the first photographs of stars were made in the following June. Up to July, 1912, about 2,000 stars had been photographed, including stars for latitude and for scale values. The photographs have all been measured twice, the apparent place reductions have been made, and the provisional latitudes determined. As the instrument had been in operation for one year only it was impossible to give any very definite results from the study of the observations.

Excellent progress was made in the geodetic work of this country during the past three years. Those portions of it which are of the greatest geographical value are the primary triangulation and the precise leveling, all in the interior of the country, which add to the framework from which will be extended a lower grade triangulation and leveling principally for the immediate control of topographic and boundary surveys.

NORTHERN PATAGONIA

An exceptionally valuable paper, entitled "Recent Surveys in Northern Patagonia," has recently been published by Bailey Willis in the *Geographical Journal* for December, 1912 (Vol. 40, pp. 607-615). The author first calls attention to the policy of the Argentine government toward the building of railroads in the so-called "desert" regions of Patagonia to promote settlement and to change them into populous provinces. One line extends westward from Puerto Deseado in Santa Cruz, another from Rivadavia in Chubut, and a third from Puerto San Antonio in Rio Negro.

It is proposed to carry the Rio Negro line not only to Lake Nahuel Huapi as originally planned, but northward and westward to the port of Valdivia on the Pacific coast. Branch railways will be thrown northward 100 miles to the old settlements of San Martin and Junin de los Andes, and southward 150 miles to the highly interesting and now flourishing colony of Welsh settlers in the Valley of the 16th of October (longitude 71° 30′ west, latitude 43° south).

The topography of northern Patagonia is comparable to that of the High Plains of Kansas and Texas, and the climate to that of parts of Arizona. Though large portions of the region have little economic value, there are extensive valleys and basins which will, in time, become centers of population.

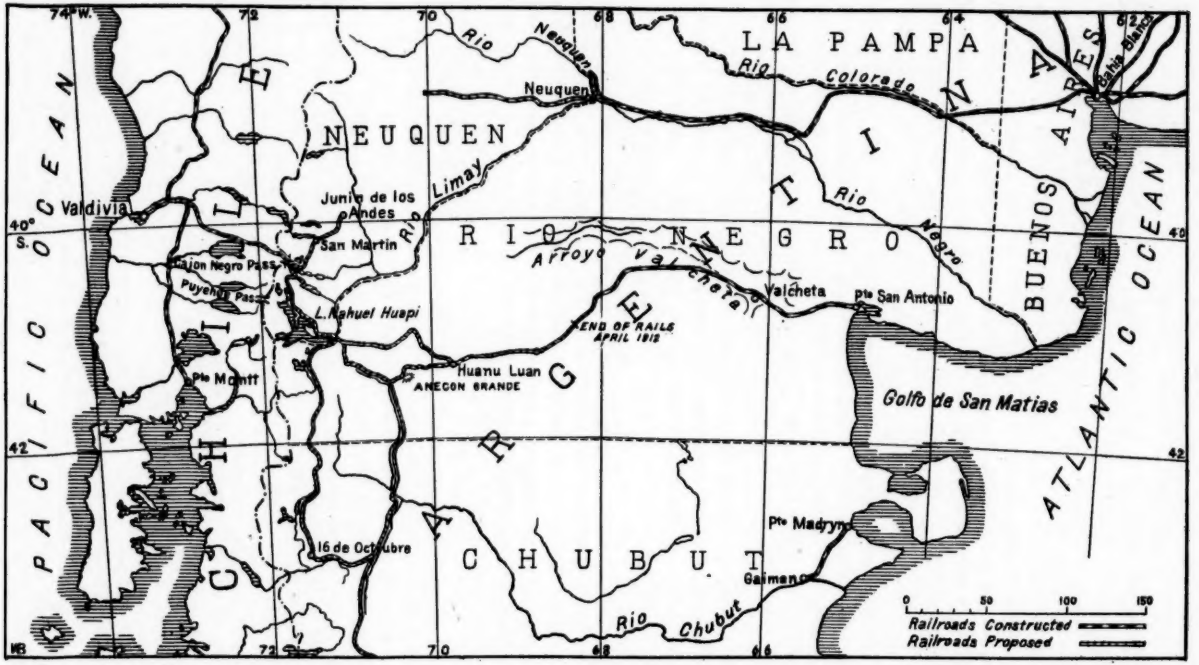
In the belt of country along the east coast the rainfall varies from eight to twelve inches per annum; it then diminishes westward about half way across the continent and again increases toward the mountains. The port of San Antonio and the railroad formerly depended entirely upon rainwater collected in cisterns or on that pumped from wells sunk in the sandhills along the coast. Sixty-eight miles inland, at Arroyo Valcheta, a clear, perennial stream was found from which water is now hauled daily to the city in tank cars. A well at San Antonio and another at kilometer 62 were unsuccessful, though they were drilled to depths of 345 and 886 feet respectively.

So condensed is the description of the geomorphology of the region and its relation to the all-important question of a water supply, that we can do no better than to quote the essential portions of it.

"Northern Patagonia is an old, deeply eroded, continental mass, composed of metamorphic slates, . . . cut by eruptive granites and rhyolites. Over this basement occur thin marine and fresh-water sediments, . . . capped by flows of basalt and andesite, and . . . irregularly distributed in more or less extensive remnants. Near the coast are younger . . . clay and gravel deposits, with layers of secondary limestone.

"As these conditions exclude the possibility of finding a water supply for the city and railway by artesian boring, attention was turned to the Arroyo Valcheta, the clear, constant stream already referred to, and it was found that the waters could be impounded in a reservoir from which they would flow to San Antonio by gravity.

"The Arroyo Valcheta is of a type common in the warped plateaus of Patagonia. Its waters gather from rain and snow in elevated lava fields, 1,000 meters (3,281 feet) or more above the sea, and finding no well-defined surface channels trickle underground till they issue in large springs at the base of the bold escarpment. Thence the stream flows in meadows and swamps, constantly losing by evaporation in its course, and finally dies in a salt lake in



Sketch Map of Railroads in Northern Patagonia, based on a map in the *Geographical Journal*, Vol. 40, 1912, p. 609. Scale 1:7,000,000.

a basin without outlet to the sea. The diversion of a part of its waters to a reservoir will redeem a large area suitable for growing alfalfa and turn a waste into use, as well as provide the necessary supply for the railway and San Antonio, for which no other source seems available.

"In crossing the continent the railway rises from the Atlantic, not by a series of terraced steps, as has often been described, but by passing across interior basins from one plateau to another, the continental surface being warped, so that basins without outlets to the sea range from south-east to north-west between high plains."

About midway of the continent is a depressed area 2,900 feet above the sea, and to the west of it is a conspicuous mass of volcanic peaks, of which the highest, Anecon Grande, exceeds 6,560 feet in altitude above the sea.

"The peaks are bold, rocky remnants of ancient volcanoes, long since stripped of cinder and ash deposits, which are spread about them and to a great extent covered by later basalt flows."

This mesa-like surface between 3,900 and 5,200 feet above the sea is cut by valleys and canyons 300 to 600 feet deep, which radiate from Anecon Grande and shed their waters to the Limay on the north and the Chubut on the south.

The difficulties of the railroad route were greater in the regions of mesas and canyons and on the plateau than in the Andes themselves; consequently a well-constructed map on the scale of 1:100,000, with 66-foot contour intervals, has been begun. There are two passes into Chile from the Lake Nahuel Huapi region in Argentina. One is known as the Puyehue Pass, long ago used by Indians and Spaniards and in recent years by settlers; the other is El Cajon Negro.

"The approach to Puyehue pass is by profound gorges, overhung by cliffs that suggest Yosemite scenery; the ascent could be accomplished only by steep grades; and the summit being broad, almost plateau-like, the line would be exposed for a long stretch to obstruction by winter snows at an elevation of 1,200 to 1,300 meters (3,937-4,265 feet). The Cajon Negro, on the other hand, can be reached by moderate grades, through beautifully forested valleys, past exquisite lakes, and the crest of the Sierra can be pierced by a tunnel about a mile in length at an elevation of 1,180 meters (3,873 feet) above sea" (p. 614).

The territory of Rio Negro comprises two distinct regions—the treeless pampas which extend from the Atlantic to the foothills of the Cordillera and are adapted to sheep and cattle-raising, and the Cordilleran district, adapted to intensive farming and manufacturing, and which will therefore become the seat of a future dense population. But a small portion of the first region can be irrigated, while the abundant rainfall of the second region and its mild climate, large rivers, beautiful lakes, and great waterpowers, give it practically all the essential physical features which man requires for his best development.

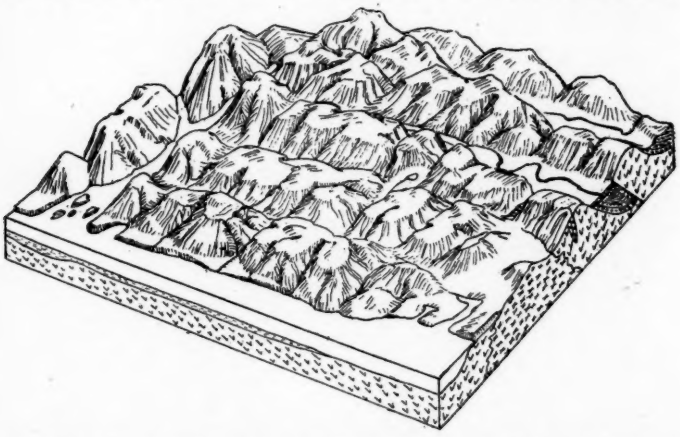
ISAIAH BOWMAN.

NOTES ON THE DESCRIPTION OF LAND FORMS.—IX.

Intelligible Physiographic Presentation.

SOUTHERN VANCOUVER ISLAND. By Charles H. Clapp. *Memoir 13,* Dept. of Mines, Geol. Survey Branch, Ottawa, 1912.

It is natural that much material for the physiographic basis of geography should be found in geological reports; but it is seldom that material of this kind is presented with so much regard for geographical needs is in the case in Clapp's report on Southern Vancouver Island. After a bibliography and summary of general geology, there follows an account of the topography, first general (pp. 16-19), then local (pp. 19-22). This opens with refreshing directness by immediately stating the chief features of the district:— "Vancouver island is a mountain range, characterized by both flat-topped and ridge-like summits, and is the result of the mature dissection of an uplifted, subdued surface formed during a Tertiary erosion cycle acting on a heterogeneous group of deformed rocks." A little further on we read: "The Tertiary erosion surface . . . had reached be-



fore uplift a stage varying from late maturity to old age. It was peneplained in the southern part, where a few rounded, monadnock-like hills remained a few hundred feet above the general level. In the central region larger and higher monadnocks and small ranges of mountains—divide residuals—survived, which apparently had elevations of from 1,000 to 3,000 feet above the general Tertiary erosion level, and which are now from 5,000 to 7,000 feet above sea-level, a few peaks being even higher . . . The uplifted Tertiary erosion surface was maturely dissected during a pre-Glacial cycle by transverse rivers with large subsequent tributaries . . . . During the Glacial period the island was apparently smothered by a thick ice-cap . . . . Valley heads in the higher mountains were excavated by local glaciers, and the mountains now have characteristic serrated summits. Valley glaciers occupied and scoured out the larger

valleys, converting many of the westward flowing valleys into fiords, and deepening many of the interior valleys into large lake basins." A significant feature of this description is, that if an uplift is mentioned, the thing uplifted is first described, and then the changes following uplift are added; when glacial action is introduced, the surface which the glaciers found is explained, and then the changes which they produced in the pre-existing surface are added. Hence the reader can follow the writer, step by step; all the more easily with the aid of good plates and a rough block diagram (looking northward), here reproduced. Even a historian might with little difficulty extract from this report all the material he would need for the scenery of any human drama there enacted.

Complicated Physiographic Presentation.

SOUTHERN NIGERIA: Some considerations of its structure, people and natural history. By A. E. Kitson. *Geographical Journal,* XLI, 1913, 16-34.

The physiographic paragraphs of this paper open most encouragingly, but close disappointingly. Three divisions are briefly described: a coastal lagoon and delta belt, 3 to 60 miles wide, raised slightly above sea level; an intermediate belt, 50 to 100 miles wide, rising steadily northward to an altitude of about 650 feet, and consisting of various stratified deposits (their attitude is not mentioned); and several separate uplands, composed chiefly of crystalline rocks, and consisting partly of a northward-rising plain, with isolated hills or groups of hills rising out of the plain to heights of over 800 feet, and partly of a more dissected area. Then comes a page on geology, ending with an interesting but irrelevant paragraph about the varied animal life seen on a canoe trip in the coastal belt. Next follow four pages on "geographical history," again ending with an excellent but irrelevant paragraph, this time on a march along a narrow path through a dense forest. "Geographical history" here means the changes caused by deposition, deformation and denudation, and might well be called geology, except that its object is, more manifestly than is usually the case in geological chapters, the evolution of the present surface form; but just in so far as the origin of existing form is the object of these pages, they are unsatisfactory, because their contents continually distract the reader's attention from present features and leave him lost in a maze of past changes.

The beginning is easy:—During the Cretaceous period, a great basin, bounded by crystalline masses on the west and east, was occupied by a sea that extended northward. Then elevation took place and the basin became an estuary, a shallow lake and possibly a low-lying land. After this comes a succession of elevations and river-wrought changes, described in relation to utterly unknown local names—like Owai Ifunkpa and Udi-Orukuram—and the reader is left hopelessly and hopeless behind. He may, to be sure, try to follow the writer's intention by searching out the place names on the accompanying map; but as the part of the map under consideration has at least 400 names upon it, the search will be a difficult one. I venture to say that no reader, not even the most studious and patient, unless he has already travelled in Nigeria, will make out the writer's meaning in the two pages that end:— "Thus the lower Niger appears to have been formed" (p. 22). The author has evidently made abundant and careful observations, and has given much serious thought to his problems; but in the end this presentation of his physiographic results is impossible to follow. In view of the publication of his article in a geographical and not a geological

journal, existing surface forms are not given sufficient emphasis as compared to past changes. A diagram, indicating the essential physiographic features, with a few local names as guides, would have been a vast help to the reader in understanding the writer, and would not have cost nearly as much labor as a day's march. Many marches were made, but not a single diagram is offered. The reader is not sufficiently considered in this part of the essay.

A German Morphological Study.

MORPHOLOGIE DES MOSELGEBIETES ZWISCHEN TRIER UND ALF. By Bruno Dietrich. *Verh. Naturhist. Vereins der preuss. Rheinlande und Westfalens,* lxvii, 1910, 83-181.

This essay may be taken as typical of many modern German morphological studies, in that it is thorough and elaborate, but at the same time not presented in form for easiest apprehension by the inquiring reader. It opens with an empirical description of surface forms, then gives an account of geological structure; and only after some twenty pages takes up an explanatory description of the district. Thus on the first page one reads:— "The Eifel and Hunsrück [the western half of the Schiefergebirge of the Middle Rhine] exhibit a broad highland 'Hochfläche' of about 500 meters altitude, from which rise isolated ridges with southwest-northeast trend, which reach altitudes of 700 meters" (p. 84). But not until sixteen pages later is the reader given the elementary explanation that the Hochfläche is "ein typisches Rumpfgebirge, eine Peneplain" (p. 100), and not until ten pages later still are the surmounting ridges explicitly explained as "Härtlinge" or monadnocks (p. 110). The intermediate pages include descriptions of geological formations in greater detail than is needed for the understanding of their influence on surface form; while the introductory account of streams and valleys is purely empirical with an over-burden of local names, which might have been better left to graphic presentation on a map. The following is a sample: "The Prüm rises on the southwest slope of the Steinberg near Ormont in the Schneifel at an altitude of 635 meters. Its direction is in general southwesterly or southeasterly. In its lower course it receives two branches, namely, from the right, the Enz near Holsthum, and from the left, the Nims below Irrel" (p. 88). Not until ten pages after the six pages devoted to these dry details is mention made of the regional uplift which caused the incision of the valleys in the "Hochfläche."

It is difficult to understand why this order of statement is so often adopted by German geographers. Many of their essays are difficult reading, because the heavy, old-fashioned cart of empirical statement is placed before the more lively and energetic horse-sense of explanatory statement. The authors of the essays seem to belong to the modern explanatory school, as one may infer by the care that they take to learn the origin of the forms that they discuss; and yet they treat the forms at first empirically, as if an empirical statement could be better understood than an explanatory one; or as if anything so deep as an explanatory statement should not be reached until after the reader had waded through an empirical introduction. Furthermore, while these authors seem to be by intention students of land forms, if one may trust the titles of their essays in which "Morphologie" often enters, many of them stop short of morphology and get no further than the preliminary step of morphogeny. They do not use the origin of the forms as a means of describing them; they fail to reach the goal of mor-

phological products, as if lost in the complications of morphogenetic processes. Moreover it is too often true of these German essays that their value is obscured by an over-abundance of irrelevant erudition and an over-elaboration of trite discussion, as well as by an excessive use of unimportant local names, a lack of page- and paragraph-headings, and a scarcity of diagrams. There is of course not the least objection to morphogenetic studies, as such; they are, as above intimated, the necessary preparation for morphological descriptions; but it is regrettable to see so many essays in which an evident morphological intention has miscarried; in which a student of geography has been lost in the complications of geology. All such complications may deserve a young geographer's study as preparation for his further work; and the young German geographer never shrinks nowadays from the large labor of acquiring a knowledge of them; but when he prints the complications of the past in his essay, he is going far out of his geographical way.

The reason for giving up the older-fashioned empirical method of describing land forms and adopting the newer-fashioned explanatory method is that the newer method gives better results than the older one; it enables the reader to conceive more easily and correctly the things observed by the writer, because it provides so many well defined ideal types in terms of which the writer may describe the forms he has seen to the reader. If this were not the case, there would be no object in changing from the older to the newer method. And yet it often happens, as in the example here cited, that an author who seems to be of the explanatory school, if one may judge by the number of explanatory terms that he uses on his later pages, nevertheless opens his description with an old-fashioned empirical statement, and only many pages later presents the simple, concise, explanatory statement that might well, if the convenience and edification of the reader were given more consideration, come at the beginning.

To be sure, if an essay is prepared for uninformed readers, an empirical, inductive presentation of the land forms may be advisable; but in that case the manner of describing the geological formations ought also to be reduced to elementary form; but this is by no means the case in modern German geographical essays. The geology is maturely scientific; it is only the land forms that are treated empirically. Both subjects ought to be treated in a mature manner, if published in scientific journals. It is a serious mistake in these modern days for a well-trained student of morphology to embarrass himself and his readers by making a ten-page mystery of a peneplain, and a twenty page mystery of some monadnocks that rise above it. He may perhaps be led into this mistake by seeking to give an appearance of safety to his explanatory results, and therefore blanketing them in many wrappings of empirical descriptions; but this is a delusion. Safety of results is not determined by style or order of presentation, but by care in investigation; and that an investigation has been careful should become evident enough in the course of a fifty- or hundred-page essay, whether it opens empirically or not. The correspondingly valuable quality of presentation is intelligibility, and this quality is by no means secured through long empirical introductions.

Any reader who can understand the geological pages in Dietrich's essay ought to have no trouble in understanding at the outset such an explanatory statement as the following: "The Eifel and Hunsrück are two parts of an extensive uplifted peneplain, about 500 meters in altitude, eroded on a body of deformed and generally resistant rocks, interrupted by several linear quartzite monadnocks,

and dissected by many valleys, of which the chief, that of the Mosel, exhibits an exceptionally well developed meandering course." After reading such an introduction, details met on later pages easily take their proper relation to larger features.

On the later pages of the same essay, one finds, not exactly a mountain made out of a mole hill, but a profound problem made out of an open depression (the so-called Wittlicher Senke) that has evidently been rapidly and widely excavated along a south-northeast belt of weak strata while only narrow valleys were eroded in the harder rocks: the depression is already "old," while the valleys are only "submature or mature." The Mosel enters the southwestern end of the depression, follows its open floor for some kilometers, then shifts into the harder rocks on the southeast, where its admirable meanders are deeply incised; but the depression continues northeastward as far as the weak rocks that determine it, although in that part of its extent it is drained only by small streams. It is not worth while making an elaborate problem out of a feature that is so easily accounted for and so readily described as is this one.

Fault block Plateaus.

NOTES ON THE PHYSIOGRAPHY OF THE SOUTHERN TABLELAND OF NEW SOUTH WALES. By C. A. Süssmilch. *Journ. and Proc. Royal Soc. N. S. W.*, xliii, 1909-10, 331-354.

One seldom has the good fortune of coming upon a more clearly presented statement of a rare problem than is here offered. It is illustrated by good photographs, and by three profiles, but it is unsatisfactory in lacking an outline map, and in locating too many physical features in terms of local names not easily found on maps of Australia; nevertheless the text is exceptionally clear. The region described lies in the southernmost part of New South Wales; it consists of highly inclined strata intruded by granites and porphyries, which have been reduced over large areas to small relief, constituting the so-called Monaro peneplain. The peneplain might sometimes be called a plain; but it is by no means continuous; it is interrupted by various hills and highlands, some of which give evidence of earlier peneplanation; it is dissected by broad shallow late-mature valleys; and it is more deeply incised by valleys of later origin which are already mature in the weaker rocks but still young in the harder rocks. It was in association with the uplift by which the deeper dissection of the peneplain was prompted that it was broken into blocks by numerous faults, mostly of meridional trend, and uplifted with diverse displacements. The Kosciusko block is the highest, with a general altitude of 6,000 feet; Mt. Kosciusko, the loftiest summit in Australia, is a monadnock which rises about 1300 feet above its peneplain. Two narrow blocks, less uplifted than their neighbors, are described as "Senkungsfelder." The stronger fault scarps rise 1,000 or 1,500 feet; they are now more or less dissected, but are still striking features of the region; from a distance "they look like mountain ranges."

A similar topic is briefly treated by Griffith Taylor in a report on "The Physiography of the Proposed Federal Territory at Canberra" (Commonwealth Bureau of Meteorology, Melbourne, 1910). Fuller details regarding all these fault scarps will be looked for with interest. W. M. DAVIS.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

CONTRIBUTIONS OF THE SOCIETY TO FIELD EXPLORATION. The Society has added $3,000 to the sum appropriated in 1912 towards the equipment of the Crocker Land Expedition. Its total contribution to this Arctic enterprise is $9,000.

The Society has also appropriated $4,000 for the Central Andes Expedition of Professor Isaiah Bowman of Yale University, and, under the auspices of the Society, he will complete his work in the Cordilleran region, where he has already spent two seasons. Professor Bowman's plans are fully outlined and the progress of the organization of the Crocker Land Expedition is reported in this number of the *Bulletin* (pp. 348-351 and p. 371, respectively).

BINDING LIBRARY BOOKS. Five thousand volumes in the library, most of them the publications of societies received in monthly or other periodical parts, will be neatly and strongly bound within the next four or five months and then returned to the shelves. This work was most desirable for the preservation of the books and will also greatly facilitate reference to the many invaluable original reports and other geographical material which these volumes contain.

NEW PTOLEMY MAPS IN THE MAP ROOM. A friend of the Society has just added to our map collections the twenty-seven maps of the scarce 1478 edition of Ptolemy's Geography. These maps are some twenty years older than any of the other Ptolemy maps in our collections. They were the first maps printed with any edition of Ptolemy and are generally supposed to be the first examples of copper-plate engraving for books. Excepting the copy of this folio in the Bibliothèque Nationale at Paris, the volume is the only one known to have been printed on vellum. The maps, in excellent condition in old binding, consist of a map of the world, ten maps of Europe, four of Africa and twelve of Asia and are of the greatest interest for the history of early cartography. They also illustrate the views concerning the western ocean prevalent for years before the sailing of Columbus. They are based on the copies by Donis of Ptolemy's maps, but the style of the drawing is greatly improved and every detail is clearly legible. This rare work is a very notable addition to the Society's collections.

THE DAVID LIVINGSTONE CENTENARY MEDAL. The Hispanic Society of America proposed to the Council of the American Geographical Society, at its meeting on March 20, the foundation of a gold medal on the centenary of the birth of David Livingstone and in memory of that explorer; the medal to be conferred by the American Geographical Society from time to time in recognition of geographical work relating to the southern hemisphere. The Council accepted with thanks the offer of the Hispanic Society of America to found the medal and provided for the investment of the fund donated for its endowment.

DR. STEVENSON'S HANDBOOK. Edward Luther Stevenson, Ph.D., of the Hispanic Society of America, has prepared for our Society a Handbook which will be very helpful to all who are interested in the forty-one maps that have been reproduced as glass transparencies and may be seen in the lecture hall windows of our building. The maps selected by Dr. Stevenson for these reproductions were such as would serve to "illustrate the development of map-making and the expansion of geographical knowledge as cartographically represented from Roman days to modern times." Each transparency is described and explained and interesting facts about the production of the maps are given. The little book will help consultants to read and understand the maps and to acquire information as to the development of map-making. Copies will be kept in the lecture hall for the use of visitors; and the Handbook may also be purchased in the office for ten cents.

EXHIBITION IN THE LECTURE HALL. The Lecture Hall is open to the public from 10 A. M. to 5 P. M. and on Sundays from 2 to 5 P. M. The exhibition of

maps of the Latin-American countries is still in progress. The most conspicuous and important maps of Ecuador, Bolivia and Venezuela were shown in the latter part of March and early in April. The maps shown on the walls and the map transparencies in the windows also attract much attention. The attendance since the report in the April *Bulletin* was 1,185.

DELEGATES TO THE TWELFTH INTERNATIONAL GEOLOGICAL CONGRESS. The Council has appointed Professor William Libbey, Dr. Randall-MacIver and Mr. Leon Dominian delegates to the Twelfth International Geological Congress which will meet in Toronto in August.

MEETING OF THE SOCIETY. A regular meeting of the Society was held in the Engineering Societies' Building, No. 29 West 39th Street, on Tuesday, March 25, 1913. Vice-President Greenough in the chair. The following persons recommended by the Council were elected Fellows:

Franklyn H. Church,
Arthur H. Clark,
Mrs. M. E. Dwight,
Julius F. Gayler,
Ogden H. Hammond,
Harry Archer Hornor,
Walter C. Hubbard,
Thomas H. Johnson,
Mrs. H. Van Rensselaer Kennedy,
Nathan Krauskopf,
François E. Matthes,
Andrew D. Meloy,
Sigmund Mendelsohn,
Gail Mersereau,
Ogden L. Mills,
Will S. Monroe,
Frank C. Moore,
William S. Myers,
D. W. Owenn,
Henry S. Oppenheimer,
Andrew J. O'Reilly,
Frederic A. Parkhurst,
Charles B. Penrose,
Henry G. Pickering,
Peter Frederick Piper,
Mrs. Whitelaw Reid,
Eben Richards,
Albert Robertson,
Harry Justin Roddy,
Jacob Rossbach,
August Rupp,
Charles H. Sabin,
Rollin D. Salisbury,
Robert W. Sayles,
Henry Mann Silver,
Henry W. Taft.

Mr. Emory C. Kolb of Arizona told the story of "A Photographer's Boat-Trip Through the Canyons of the Colorado." A large audience enjoyed Mr. Kolb's narrative of the remarkable journey of his small party by boat from Green River City in the east to Grand Canyon in the west. His photographs illustrating many phases of the long series of canyons were unequaled in their variety and excellence; and the numerous moving pictures in which his small boats were seen tossing like egg-shells in the swirl and plunge of the Colorado River rapids added a flavor of excitement to the occasion.

NORTH AMERICA

NEW BUILDING FOR THE U. S. GEOLOGICAL SURVEY. Congress has authorized the expenditure of over $2,500,000 for the erection, in Washington, on ground already owned by the Government, of a fine building to be occupied by the Geological Survey, the Reclamation Service, the Indian Office and the Bureau of Mines. Mr. Alfred H. Brooks, Mr. Sledge Tatum and Mr. Herman Stabler, all of the Geological Survey, have been appointed an advisory committee to assist the Director in regard to the plans for the new building.

A MODEL OF KILAUEA. The Geological Museum of Harvard University is sending Mr. George Carrol Curtis to Hawaii to collect data for a naturalistic model of Kilauea Volcano. For years past Mr. Curtis, who is a geologist and geographer, has specialized in land relief and has brought a new motive and standard into the making of relief models. He made a strong plea for the production of land relief models that are true to nature in the *Bulletin* in 1911.* Kilauea Crater lies within the recently surveyed U. S. National Volcano Park. Mr. Curtis's model of the volcano will be 12 feet long on a scale of 1:1,500, and

*Land Reliefs that are True to Nature. George Carrol Curtis. *Bull. Amer. Geogr. Soc.*, Vol. 43, 1911, pp. 418-427.

it is expected to be a valuable contribution to the study of volcanoes. Among the recent works of Mr. Curtis is his relief model showing the effects of the earthquake at Valparaiso which he placed in the Harvard Geological Museum.

EXAGGERATED CROP REPORTS. Prof. Cyril G. Hopkins of the University of Illinois has an article "Facts and Fiction about Crops" in *Science* (No. 952, 1913, pp. 470-476), in which he says: "Careful investigation reveals the fact that the reports from the Federal Bureau of Statistics as published by the Secretary of Agriculture are highly exaggerated and deserving of the strongest condemnation, although all would be glad to give praise if these glowing reports were true." To prove this assertion Professor Hopkins adduces many statements from the Annual Reports of the Secretary of Agriculture and compares them with census statistics collected every ten years "when every farmer and land owner in all the states must make a sworn statement in regard to his crops and herds." Thus, while the crop statistics of the Agricultural Department claim an increase of 50 per cent. in the production of corn in the Southern States from 1899 to 1909 the data from the U. S. Bureau of the Census show an actual decrease of 7 per cent. Many other similar facts are given.

CLIMATE OF PUGET SOUND BASIN. Professor E. J. Saunders, of the University of Washington, is making a study of the climate of the Puget Sound Basin region. In a report on "Field Operations of the Bureau of Soils," U. S. Dept. of Agric., 1910 (Washington, D. C., 1912, pp. 16-29), he has given a concise account of the climate of the western part of the Puget Sound Basin, with a refreshingly small amount of numerical data, and illustrated by means of typical temperature curves for summer and winter, charts showing the first and last dates of frost, and a diagram showing the average monthly precipitation. The section of Washington in question has a marine climate, with a decided winter maximum of precipitation. There are many clear and pleasant days during the months of maximum rainfall, and the rainy days, except occasionally when accompanied by high winds, are warm and pleasant. The conditions from May to October are described as "ideal," with but five to twelve rainy days a month, few hot days, and no oppressively hot nights. R.DEC. WARD.

MR. MATTHES'S LECTURES ON MOUNT RAINIER, THE YOSEMITE AND TOPOGRAPHIC DELINEATION. Mr. François E. Matthes, of the United States Geological Survey, gave an illustrated lecture before the Appalachian Mountain Club on March 18, on "The Glaciers of Mount Rainier." He placed special emphasis on the fact that Mount Rainier, because of its elevation high above the general level of the Cascade Range, rises far above the zone of the storm clouds and therefore receives much heavier snowfalls on its lower slopes than on its summit. While this is in some measure offset by the greater ablation occurring at the lower levels, the result nevertheless is that more glaciers originate on the mountain's flanks than on its crown. The view formerly held, that the summit platform is the main gathering ground of snow and therefore the main source of the glacier system, must consequently be abandoned. Furthermore, there is ample indication that during glacial times this relative paucity of snow on the summit was greatly accentuated, for the zone of maximum precipitation was then depressed to altitudes between 4,000 and 6,000 feet, and the volcano reared its head nearly two miles above the clouds, into atmospheric strata of relative dryness. Glaciers of large volume originated at its base, that is, at the same levels at which all the ancient glaciers of the Cascades made their start, but on the cone of the volcano the ice, while much thicker than now, did not increase in proportion. On the summit itself there was probably but little, if any, more snow than there is today. On March 19, Mr. Matthes repeated this lecture at Wellesley College.

On March 20, Mr. Matthes gave an illustrated lecture before the classes in Civil Engineering and Mining of the Massachusetts Institute of Technology on the "Sculptural Features of the Yosemite Valley." He showed that these features are in a large measure expressive of the structure of the country rock, weathering and erosion having been effectively guided by the joints. At the same time he explained the engineering difficulties that were involved in the accurate delineation of the cliff features on the large-scale map of the Yosemite Valley.

On March 22, Mr. Matthes spoke before the classes in Civil Engineering and Mining at Dartmouth College on "The Principles of Topographic Delineation," exhibiting maps showing examples of different kinds of topographic texture, different genetic types of topography, different index forms, etc. He further illustrated his talk with views of the Yosemite Valley and portions of the Yosemite map, showing how the principles announced had been applied to the difficult problem of bringing out the distinctive characteristics of the Yosemite topography.

EARLY SPANISH-AMERICAN EXPLORATIONS. In his volume "The Viceroy of New Spain"*, Donald E. Smith, Assistant Professor of History and Geography in the University of California, sums up in a footnote the greater facilities now enjoyed by investigators of Spanish-American history. This note is here reprinted because the new facilities mentioned afford also far greater opportunities for the investigation of geographical exploration and research in the Spanish period of American enterprise:

"The unusual facilities, compared with the past, which are now enjoyed by the investigators in the field of Spanish and Spanish-American history are due principally to three facts. The first is the more liberal policy adopted in recent years by the officials of the Spanish archives in throwing them open to foreign students and allowing them to work without subjecting the materials they take out to a censorship. These favorable conditions exist now in the great repositories of documents at Simancas, Madrid, and Seville. The second is the systematic study which is now being made of the archives of Mexico under the auspices of the Carnegie Institution of Washington. The third is the conversion of the great library of Mr. H. H. Bancroft from a private collection into a public one, accessible to all qualified students. It perhaps ought to be said that an additional aid is being offered to scholars by the action of the Mexican Government in publishing so many documents of the highest value dealing with the history of the country. On the other hand, the great series of *Documentos Inéditos para la Historia de España* reaches only to the seventeenth century."

MR. LEFFINGWELL RETURNS FROM ALASKA. Mr. E. DeK. Leffingwell has been spending the past winter at home after nearly six years on the north coast of Alaska where he was engaged in geographical, geological and hydrographical work. The *Bulletin* has, from time to time, published notes on the progress of his surveys and studies. His work has been devoted largely to explorations over an area of 60 by 120 miles, lying between Long. 142° and 150° W. and from Lat. 69° to 70° N., with Flaxman Island as a base.

HYDROGRAPHIC SURVEYING IN CANADA. The Hydrographic Survey Branch of the Department of the Naval Service carried on work during the season of 1911 in Lake Ontario, the lower St. Lawrence River, the Pacific Coast and Hudson Bay. Work was begun in Lake Ontario by a survey of Main Duck Island on the approach to Kingston Harbor. The regular work consisted of a water triangulation from Presqu'ile to Port Darlington, a traverse of the shore between these points, and soundings off shore for a distance of about 12 miles. An accurate contour was obtained here. No shoals were discovered, but the edges of the banks were determined. Plans, on large scales, were made of Cobourg Harbor and Port Hope.

In the lower St. Lawrence River triangulation, traversing and sounding were carried on near Bic Island and Father Point. On the Pacific Coast operations were started in Arthur Passage with the view of finishing the surveys needed for the completion of the chart of that channel. A new plan of Skidegate Inlet was prepared which showed important differences from the charts of 1866. At the western approach to Dixon Entrance several positions in which breakers had been reported were examined but no sign of doubtful water was found. The survey of Cousin Inlet was also begun but was not completed before bad weather set in.

Of the three parties in Hudson Bay one was equipped to secure reliable data concerning the magnetic declination in Hudson Bay and Strait, both in amount

* Univ. of Cal. Publications in History, Vol. 1, 1913, No. 2, pp. 99-293.

and annual change by comparisons with observations in 1884 and 1885. During the season new charts were issued of Presqu'ile Bay, Cove Island to Duck Island, Bic Island to White Island and Churchill Harbor (St. Lawrence River).

MEMORIAL TO CAPTAIN SCOTT AND HIS DEAD COMRADES. Funds are being raised in Great Britain to erect a permanent memorial in honor of Captain Scott and the heroes who perished with him. American aid has been invited and a branch of the Joint Fund with Mr. Henry Clews as treasurer has been opened in New York. The movement has the endorsement of the American Geographical Society and many other scientific bodies. The list of American donors is headed by Rear Admiral Peary, Dr. Henry Fairfield Osborn, The Hon. Joseph H. Choate and other leading citizens. The American committee has made a special appeal for the support of members of the American Geographical and other scientific societies before whom Capt. Scott had hoped to appear in person to tell his story of work and achievement in the Antarctic. Donations should be sent to Mr. Henry Clews, Treasurer, 15 Broad St., New York.

SOUTH AMERICA

THE AMAZON VALLEY TO BE EXPLORED BY THE UNIVERSITY MUSEUM OF PHILADELPHIA. The University Museum of Philadelphia has just sent an expedition to the Amazon Valley to collect information relative to the aboriginal inhabitants and to explore the forests where these primitive peoples still roam untouched by civilization.

The expedition has been finely equipped. A steam yacht has been provided with everything for the comfort and safety of the members or the prosecution of the scientific work. The steamer is 132 feet long and, drawing only six and a half feet of water, is designed to navigate even the smaller tributaries of the Amazon for thousands of miles.

Leaving Philadelphia in March, the steamer proceeded to Para there to make final arrangements for an extended cruise. It is proposed, first, to explore the northern tributaries of the Amazon which rise in the mountains on the borders of Brazil and the Guianas. Here are peoples of the great Carib stock, of whom practically nothing is known, as well as representatives of the equally important Arawak stock. The next region to be explored is that which is drained by the Rio Negro with its affluents, the Rio Branco and the Uaupés. Finally, an effort will be made to reach the isolated tribes in the vast unexplored forests between the Rio Madeira, the Rio Tapajoz and the Rio Purús. In each case the steamer will proceed as far as possible up the affluents, and canoes will be used to reach the less accessible head waters. Since the tribes, as a rule, live some distance from the rivers, it will be necessary to penetrate into the forests and to remain in the native villages long enough to make the necessary observations and collections to illustrate the native arts. These collections will then be carried to the steamer which will become a storehouse of ethnological material until such time as they may conveniently be embarked at Manaos for shipment to New York and Philadelphia. The special studies will be those which come under the head of ethnology—the native arts and industries, social organization, religious beliefs, and linguistic relationship. The University Museum is desirous to use the material for an exhibition to illustrate the life of the Amazonian tribes.

But a large amount of geographical work will also be done. The valley of the Amazon is in fact one vast forest where modern civilization has never penetrated and where the only industry connected with modern life that has taken root is the extraction of rubber from the native forests. Neither agriculture nor mineral wealth has attracted the white man's enterprise. Here, consequently, is found the last great unexplored tract of the earth's surface and here remain the last tribes who still roam the forests as they did before Columbus and pursue unmolested the habits of primitive life. The explorers of the Amazon have heretofore confined themselves to the main stream or to a few of its tributaries. The present expedition will aim to penetrate those parts that have heretofore received little or no attention. A great work of exploration remains to be done. The territory is large and it will require many years and many different expeditions to bring such a vast territory under complete scientific investigation.

It is proposed that while the exploring parties are engaged with the natives in their distant haunts, the party in charge of the steamer will conduct geographical and hydrographical surveys of the rivers and their tributaries. In this way, a great deal of geographical information will be obtained which will be useful from a scientific standpoint, as well as from practical considerations.

The Government of Brazil, has indicated its readiness to cooperate with the University of Pennsylvania to secure the success of the expedition and to make its labors most effective. The important results which may be expected from this undertaking will bring as much credit to Brazil as to the University of Pennsylvania and will secure for both scientific and practical results of the very greatest permanent value.

The leader of the expedition is Dr. William Curtis Farabee, F.R.G.S. The Commander of the yacht is Captain J. H. Rowen, U. S. N., Retired, Annapolis '91, who will have charge of the geographical work of the expedition and the mapping of the regions to be explored. The physician is Dr. Franklin H. Church of Johns Hopkins Medical School, '06.

ASIA

American School of Archæology in China. The Council of the Archæological Institute of America, in a meeting at Washington in December last, appointed a committee to investigate and report upon the advisability of establishing an American school of archæology in China. The report will be submitted at the annual meeting of the Institute in Washington in December next. The objects of the American school, when established, were thus defined: (1) To prosecute archæological research in Eastern Asia; (2) to afford opportunity and facilities for investigation in Asiatic archæology; (3) to preserve objects of archæological and cultural interest in museums in the countries to which they pertain, in cooperation with existing organizations such as the China Monuments Society, Société d'Ankor, etc.

This movement, in which Mr. Frederick McCormick is prominent, is the natural complement of the China Monuments Society organized by Mr. McCormick at Peking in 1908 to prevent foreign vandalism in China, to protect and preserve antiquities, to encourage China in the formation of a national museum, etc. The American School of Archæology in China will be in part a realization of the aims of the China Monuments Society because it is expected to provide for research on a comprehensive scale and is a serious effort, backed by adequate funds to carry on its work.

Climate of Turkestan. Within the last few years several writers have discussed the desiccation of Turkestan. Among them have been von Ficker, Olufsen, v. Schwarz, Woeikof, Berg and Schokalsky (both Professor Olufsen and Professor Schokalsky were among the European members of the Transcontinental Excursion of the American Geographical Society during the past summer). Naturally, the opinions expressed by these different writers have not been altogether alike. Now comes Dr. Fr. Machatschek, also a member of the Excursion, who has lately traveled in the western Tian-Shan. He has studied the available meteorological records and also made his own observations on the ground. His conclusion is that neither meteorological observations, nor the evidence of the inland lakes and the glaciers of Turkestan give a basis for the belief in a progressive desiccation of the country ("Das Klima von Turkestan," *Met. Zeitschr.*, Oct., 1912). R. DeC. Ward.

Progress of Indian Surveys. The last Report issued by the Survey of India summarizes the work of the 1910-1911 survey year. The colony is divided for this purpose into three administrative circles. The line between the northern and southern circles extends along the Tropic of Cancer while the eastern circle extends roughly east of the 84th meridian. About 50,000 square miles were surveyed of which 27,528 fell within the northern circle and 13,171 in the southern, the rest, some 9,150 square miles being in the eastern circle. In Kashmir an area of 3,574 square miles was surveyed on the scale of one inch to a mile in the Jhelum valley. Districts west of Lahore in the Punjab were surveyed on the two-inch scale in a country of plains, well cultivated and intersected by rivers

and irrigation canals. Considerable work was also prosecuted in the Delhi and Gurgaon districts as well as farther south at Lucknow and in adjoining districts. Forest surveys mostly on the two-inch scale were carried out by the topographic parties in whose spheres of work the forests lay. A party was employed on latitude observations and ten stations were visited, six of which are in Baluchistan and Sind, Khoyak being the most northerly and Sultan Ka Gót near Shikapur the most southerly.

As a result of leveling operations, bench marks have now been fixed in the Lesser Himalayan Range on seven different lines, *viz.:* Tindharia, Naini Tal, Lansdowne, Mussorie, Solon, Dhamrankot, Murree. A new line from Dera Ismail Khan to Chinda gives a valuable connection with the Trans-Indus Mountains. The classes of maps published consist of the map of India on the one-inch and one-fourth inch scales, geographical maps on the one-millionth scale, small scale geographical maps and maps specially prepared for various administrative requirements. Four new sheets of the 1:1,000,000 series were published and six were reprinted in revised form. Good progress was made in the compilation, drawing, examination and engraving of both geographical and special maps.

AUSTRALASIA AND OCEANIA

PROSPERITY OF HAWAII. The year ending June 30, 1912, was the culmination of a period of prosperous years for the Territory of Hawaii. Sugar prices were high and exports and other products steadily advanced. Over 99 per cent. of the exports went to the United States and over 81 per cent. of the imports came from that country. The tariff is largely responsible for the predominance of trade with the United States though the comparatively short distance between the territory and the mother country also helps to give the United States most of the trade with the islands. The great success of the sugar industry has had the effect of accumulating capital which is being expended in the development of other industries. The tourist traffic is also steadily increasing, the visitors spend large sums locally and the value to the islands of the tourist traffic is now very important. The cultivation of pineapples is being carefully developed and it is expected that in bananas and other fruits, coffee and tobacco, Hawaii will some day compete with the West Indies and South American countries for the United States trade. The territory is looking forward to the opening of the Panama Canal when it hopes to enlarge its export trade not only with the United States but also with Canada and Europe. (Condensed from Report by Acting British Consul at Honolulu in *Board of Trade Journ.*, No. 851, 1913, pp. 662-663.)

EUROPE

INCREASE OF MINING IN THE URAL MOUNTAINS. The *Izvestiya* of the Archangel Society for the Exploration of the Russian North (No. 1, 1912) says that there has recently been a marked renewal of activity in the mining centers of the Ural. Two new platinum deposits have been discovered on the upper Kosva and Bobrov rivers. The first belongs to peasants, and they are mining the metal without outside assistance. New graphite beds have been uncovered in the Zlatoust district, and there is an increase in the output of iron and copper. About 91,600 ounces of gold were mined in 1912. A new branch of the mining industry there is marble quarrying in the Zlatoust district. Little attention has been given heretofore to iridosmium, but it is now planned to establish works for mining it, as its price is double that of platinum in the markets.

H. DE H.

POLAR

THE CROCKER LAND EXPEDITION. The March number of the *American Museum Journal* announces that preparations for the Crocker Land Expedition are progressing satisfactorily. The University of Illinois has made an appropriation which provides for the addition of a trained zoologist to the expedition party, and Dr. M. C. Tanquary, a graduate of the University, has been appointed to the post. The General Electric Company has offered to contribute a thoroughly

up-to-date outfit for power for wireless telegraphy and electric lighting, heating and cooking; the American Geographical Society has added $3,000 to its previous subscription of $6,000; Mr. Zenas Crane has increased his subscription by an additional $2,500 dollars; Mr. George B. French has added $1,000 to the fund and Colonel D. L. Brainard has contributed $100. The United States Navy Department has added the detail of a skilled electrician and wireless operator to its previous detail of Ensign Fitzhugh Green to the cartographic and magnetic work of the expedition; the United States Hydrographic Office and Naval Observatory are lending a number of surveying and other instruments and the Department of Agriculture, through the Weather Bureau, is providing a full equipment for the establishment of a meteorological station at the permanent headquarters on Bache Peninsula. The Bureau of Terrestrial Magnetism of the Carnegie Institution is to supply the instruments required for making and recording the magnetic observations. Georgetown University, Washington, D. C., is loaning the party a Wiechert seismograph for the establishment of a station at the home headquarters on Flagler Bay, which is to be under the care of Mr. Green. Other assistance in the way of money and equipment is promised.

French Expedition to Franz Josef Land. It is announced that a French expedition for the scientific exploration of the little-known northeastern part of the Franz Josef Land Archipelago is being organized, with the approval of the French Government, by M. Jules de Payer, son of the Austrian discoverer of Franz Josef Land. M. de Payer, who is a French citizen, has for some time been preparing himself for Arctic work by scientific study. His staff will include a naval lieutenant, an army and a navy doctor, a military airman, and a geologist. In order to avoid the disaster which overtook the *Tegethoff* (the ship of the Austrian expedition), it is proposed to establish a base in Franz Josef Land, sending the ship home before the winter, during which scientific work will be carried on at the base. During the succeeding summer a varied programme will be executed with the help of a boat with auxiliary power and two aeroplanes. (*Geogr. Journ.*, Vol. 41, 1913, No. 3, p. 289.)

PERSONAL

Professor W. M. Davis. Professor Davis has been elected Honorary Member of the Hungarian Geographical Society of Budapest and Foreign Member of the Swedish Anthropological and Geographical Society of Stockholm.

Mr. Vilhjalmur Stefànsson. This explorer lectured before the Royal Geographical Society, London, on March 10 on the "Arctic Islands and Their Eskimo Inhabitants."

OBITUARY

Paul Lemosof. M. Paul Lemosof, Librarian of the Paris Geographical Society, who has been in the service of the library since 1879, is dead. He will be succeeded as Librarian by Mr. Reby.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Geography of Missouri. By Frederick V. Emerson. 74 pp. Maps, ills., bibliogr. *Bull.* Univ. of Missouri. Educat. Series, Vol. 1, No. 4. Columbia, 1912. 9 x 6.

This little book is a real contribution, being a well-written geography of an important state that lies partly in several rather distinct physiographical provinces of two leading physiographical regions of the United States. From a study of rocks, and physiographical processes, the treatment passes naturally to the provinces; and from the latter to soils, minerals and climate. In these three points and in the subsequent discussion of settlement, towns and the leading industries the treatment is essentially topical. Similar work done for many states, or a more distinctly regional presentation, by regions, throughout the United States would give us a splendid body of source literature for American geography. A number of typographical errors have crept in.

G. D. HUBBARD.

Reseña de la Segunda Sesión del XVII Congreso Internacional de Americanistas efectuada en la ciudad de México durante el mes de Septiembre de 1910 (Congreso del Centenario). iv and 486 pp. Ills., index. Museo Nacion. de Arqueol., Hist. y Ethnol., México, 1912. 9½ x 7.

The titles of the papers in this volume illustrate the wide range of aim actuating the researches of the Americanists gathered in Mexico on the occasion of the first centenary of the republic's independence. It is not surprising therefore that geography should have been well represented where catholicity of purpose prevailed. In fitting homage to von Humboldt, Dr. Oberhummer reviews the eminent explorer's trip to Mexico and briefly touches upon the physiographic foundation which underlies the general observations in the "Essai Politique sur le Royaume de la Nouvelle Espagne."

A list of equivalent geographical names in the ancient and modern Maya and Mexican languages is appended by Mr. Bercerra to a diary of Cortez's winter trip of 1524-1525 to Las Hibueras, south of Yucatan. Cartography is represented by a study of Louisiana, in the nature of a brief summary, in which the general neglect to read proofs thoroughly, which is apparent throughout the volume, becomes very conspicuous by such mention as the American Geographical Societies of Paris, London, Rome and Seville.

Reference to economic geography itself may be gathered from Mr. Walkins's paper on South America although this article was evidently not prepared with any conception of its fundamental geographical basis. LEON DOMINIAN.

SOUTH AMERICA

Sous la Croix-du-Sud: Brésil, Argentine, Chile, Bolivie, Paraguay, Uruguay. Par Prince Louis d'Orléans-Bragance. 2ème édition. 484 pp. Map. Plon-Nourrit et Cie, Paris, 1912. Fr. 7.50. 9 x 5½.

On page 71 we read that it is useless to attempt to check the people of Argentina in their dream of hegemony. They are madly ambitious for their

country, which they would like to put "at the head of the destinies of the universe." On page 176 the assurance is given by the distinguished author (a soldier, a soldier's son, and grandson of the late Dom Pedro, the exiled emperor) that Chile's army is superb, and that if the hour arrives when the sword shall be unsheathed—his expression indicating a belief that such an hour will come—the Chilean army will astonish the world. He cannot give conclusions derived from his own personal observation of present conditions in Brazil, for the reason that the government authorities at Rio, Santos, and Corumba did not permit him to set foot on Brazilian soil; and there is little or no justification for the subtitle, which conveys an impression that the author describes all the countries named. But Brazil's past and future interest the prince intensely. The opinion is expressed quite frankly in the second chapter that Argentina, Brazil, and Chile should unite in an effort to form a "bloc" which, whenever occasion arises, might be placed in opposition to the United States. His ideal, as a native of Brazil, is virtually the displacement of the preponderance of the United States through the creation in the New World of the balance of power so familiar to statesmen of the Old World. He fancies that the three great South American countries, acting as one, might put an end to the Anglo-Saxon peril, guaranteeing the territorial integrity of the weaker republics, and establishing, as the Monroe doctrine's corollary, the exclamatory and somewhat menacing declaration: "South America for the South Americans!". One of his main purposes, when entering upon his journey under the Southern Cross, was, not to surrender his own dreams, but to labor (and to wait, probably) for their realization.

ASIA

A Modern Pilgrim in Mecca and a Siege in Sanaa. By A. J. B. Wavell. ix and 349 pp. Map, ills. Constable & Co., Ltd., London, 1912. 10s. 6d. 8½ x 6.

Part I, deals with a visit to Mecca and Medina. The author says that "no professing Christian has set foot in either Mecca or Medina since the time of the Prophet," and that "the Europeans who are known to have been to Mecca during the past 100 years number rather more than a dozen, and of these, four, including the writer, have been Englishmen. The visitors to Medina have been fewer still." Mr. Wavell, traveling in disguise and at the risk of his life if discovered, made the journey to these two places during the pilgrimage season when thousands of pilgrims had assembled. Even near the caravan route from Medina to Mecca is an unexplored region which offers a field to the pioneer explorer.

Part II, deals with the author's experiences in Yemen, the mountainous country in southwestern Arabia. He was in Sanaa, the capital of Yemen, during the siege of the city by the Arabs in January 1911, when the Imam endeavored to drive the Turks from Yemen. Attempting to pursue his journey, Mr. Wavell was captured by Turkish troops as he was escaping from Sanaa, and turned back from his proposed line of travel.

The author points out another region awaiting exploration—the highland country lying to the north of the Hodeida-Sanaa road, of which he writes, "we know next to nothing. The whole country is rich in relics of the Sabaean and Himyaritic civilizations."

The descriptions of the people and the country through which the author traveled give the book geographical value. WILBUR GREELEY BURROUGHS.

Une Colonie Modèle la Birmanie sous le Régime Britannique. Par Joseph Dautremer. 300 pp. Map, ills., index. E. Guilmoto, Paris. Frs. 6. 9 x 6.

Sundry blue books are sufficient evidence that the British administration of Burma has not been an unqualified success. Probably the shortcomings of administrators are not so great as they are made to appear by members of the opposition when questions are asked in Parliament, but so long as the dacoit

keeps on qualifying as an expert marksman it cannot be said that the kingdom of the late Theebaw is wholly at peace. It challenges curiosity, therefore, to find this French observer (he had been for four years consul at Rangoon), denominating Burma a model of colonies in his title and continuing the praise through 300 pages. He goes to lengths from which Sir James Scott, the best and most sympathetic of administrators of Burma, refrains. Except for the meed of praise, and this we find to be suspicious, the work adds nothing to recent English volumes dealing with the subject. The illustrations warrant high commendation. They are excellently executed half-tones from photographic plates by Johannès of Mandalay of magnificent clearness of definition.

WILLIAM CHURCHILL.

The American Occupation of the Philippines, 1898–1912. By James H. Blount. xxi and 664 pp. Map, index. G. P. Putnam's Sons, New York, 1912. 9 x 6½.

Experience agrees upon the wisdom of the adage that history is not to be written during the lifetime of the participants in the events recorded. Yet that does not militate against a totally distinct order of value for works such as this. It is charged with the vivid recollection of events in their immediacy. Its judgments have spirit behind them. Judge Blount disagrees with the ground principles of Philippine administration and is wholly opposed to the terms of our occupation of the great Eastern archipelago. That comes within his own right of judgment. He will find sympathizers and equally he will find dissidents quite as earnest; but the principal thing to say about the work is that whereof he writes he knows with the intimacy of daily observation through a period of fourteen years as soldier, jurist and administrator. The problem of the great proconsulars is a hard one, remote, essentially friendless, bound never to explain but only to command; criticism of such should be replete with charity, for the critic can never know what burdens lie upon the administrator. This personal narrative of the details of Philippine administration will possess all the greater value when we connote that the author was considered by his chiefs to be among the most capable of Philippine administrators. WILLIAM CHURCHILL.

Arabia Petræa. Von Alois Musil. II. Edom. Topographischer Reisebericht, 2. Teil. x and 299 pp. Map, ills. III. Ethnologischer Reisebericht. xv and 550 pp. Ills., index. Kaiserl. Akad. der Wissenschaften, Vienna, 1908. 15 kronen, for 2 vols. 10 x 7.

In 1888, Charles Montagu Doughty, the eminent Scotch explorer, gave us in his "Travels in Arabia Deserta" (2 vols. Cambridge) a vivid and most scholarly description of his archæological researches in unknown Northern Arabia, making us familiar with the country and the people. These volumes by Alois Musil fittingly supplement the splendid literary results by Doughty. Musil, professor in Olmütz and a catholic priest, who first became known through his masterly work on Kusejr 'Amra, the old castle in the desert, built by a calif of the Eighth century in the territory of the ancient Moabites, gives us in these volumes a many sided description of this biblical country. His scientific education is thorough and fits him well for archæological and ethnological researches. Musil shows the same keen interest in fauna and flora that he manifests in the various Arab tribes, their institutions and their social, family, and religious life. Especially noteworthy are the chapters on the condition under which the women live. In the Arab tribes as among the Fellahin, the woman must work more and harder than the man. Among the Fellahin, the woman is very often beaten, an infliction which she has to bear as long as blood does not flow and bones are not broken, because "the flesh of the woman belongs to the husband, but her bones to her family." If she flees to her family and complains about her bad treatment, she is usually compelled to return to her husband because, otherwise, the bridal price must be refunded. The Sahari is not allowed to sell his wife or children because they do not belong to him, but to his tribe. Neither is he allowed to kill wife or children. Only the adulterous wife is he at liberty to kill. The same fate befalls the daughter who becomes a mother before mar-

riage or who elopes with a man. The population of Arabia Petraea is about 70,000. The inhabitants may be grouped in forty-eight clans. They have faithfully kept their ancient traditions, customs and manners, which have hardly been influenced by Christianity. Ancestral worship everywhere prevails. The tomb of the clan-patriarch is highly venerated and the blood of animals is sacrificed upon it.

The volume on Edom is mostly of an archæological nature, but also valuable for the geographer, who gets here a clear picture of the country traversed by Musil under the most dangerous circumstances. The report covers the travels of Musil in 1901 and 1902. The Roman antiquities, churches, tombs and monasteries of the early Christian period are amply described and illustrated by numerous and excellent photographs. CHARLES L. HENNING.

AUSTRALASIA AND OCEANIA

Pygmies and Papuans. The Stone Age of To-Day in Dutch New Guinea. By A. F. R. Wollaston. With appendices by W. R. Ogilvie-Grant, A. C. Haddon, and Sidney H. Ray. xxiv and 345 pp. Maps, ills. Sturgis & Walton Co., New York, 1912. 10½ x 6½.

In this volume we have the geographical record of the expedition toward the snowy mountains of Dutch New Guinea prosecuted in fifteen months of 1910 and 1911 under the direction of the British Ornithological Union. That the expedition failed of its goal is unfortunate, but that may be corrected by the second expedition now in the field under Mr. Wollaston's command, which is expected to return in 1913. In the expedition of which this volume affords us a view, the failure of the announced purpose need not detract in the least from the fact that a wholly unknown region has been opened to knowledge in the riverine tangle of mangroves on the south shore of western New Guinea. Thus we acquire a satisfactory record of topography of unknown lands in an area approximately a degree square. Two-thirds of this is mangrove swamp, yet in this difficult country no less than three considerable rivers have been surveyed. The northern third of the area lies on the southern face of the Nassau Range; here many elevations have been trigonometrically determined and contours drawn in such an approach to accuracy as to establish the different river systems which derive from the snows. The expedition had no sooner reached the hills than it encountered one of the pygmy races, the Tapiro. Through various reasons it was difficult to acquire much information as to these shy savages, but the record is not to be neglected on that account, since a peculiar value must always attach to such reports of first discovery. The geographical results of this reconnaissance will probably prove satisfying for a long time to come. The hills are practically unapproachable through these dense swamps and there is nothing in the mud to attract newcomers. The ethnological reports leave much to be desired. In the discussion of the brief vocabulary collected from the swamp dwellers Mr. Sidney Ray criticizes destructively my development of a southern exit of the Polynesians from Indonesia by way of Torres Strait, my Viti Stream of the Proto-Samoan migration; this is not the place for rebuttal save in so far as it may be permitted to suggest that a slight acquaintance with seafaring sometimes serves a better end than some philology. WILLIAM CHURCHILL.

EUROPE

Marken and its People. By George Wharton Edwards. 182 pp. Ills. Moffat, Yard & Co., 1912. $2.50. 9 x 6.

On the island of Marken in the Zuyder Zee, live a people whose attitude toward visitors has not always been hospitable, perhaps because there are many mere curiosity hunters among the tourists who go there. Tourists, however, seldom remain over night, or go beyond the first settlement they reach. The author is one of the few who have lived with the Markenites and studied their

home life. He describes Marken as "a number of small, sandy hillocks, divided by shallow canals and reenforced by low, strong dikes upon which are mounds of earth brought from the mainland, and connected by narrow brick-paved paths, whereon the wooden houses are built upon piling." He says that the original inhabitants were probably driven to the island by the Inquisition which flourished on the mainland during the Spanish occupation. The present descendants are of the Reformed Church and, cut off from outside influence and unmolested, they have preserved the quaint characteristics and customs of their forefathers. The author undoubtedly shows life on Marken as it really is.

WILBUR GREELEY BURROUGHS.

Along Spain's River of Romance: The Quadalquivir. The Lure of the Real Spain in Andalucia—Its Personality, Its People and its Associations. By Paul Gwynne. xiv and 356 pp. Ills., index. McBride, Nast & Co., New York, 1912. $1.75. 8½ x 6.

"Paul Gwynne" (otherwise Mr. Ernest Slater, editor of the *Electrical Times*,) has written a valuable and delightful book about the Guadalquivir and its naturally splendid valley. His observations upon geology, climate, and history are worth while and he also deals expansively with the picturesque elements that one always encounters in Andalucia. Some of the tales and descriptive passages, exactly true to the spirit of the region, are good enough to have been written by a twentieth century southern Antonio de Trueba. He deals superficially, however, with the art of the valley. The black-and-white illustrations are good. The view at Córdoba, facing p. 160, and the frontispiece (both in colors) are admirable.

Boden und Klima auf kleinstem Raum. Versuch einer exakten Behandlung des Standorts auf dem Wellenkalk. Von Dr. Gregor Kraus. vi and 184 pp. Map, ills. Gustav Fischer, Jena, 1911. Mk. 8. 9 x 6.

This monograph, dealing with a limited territory in Unterfranken, Bavaria, describes the geological horizon of the lower Muschelkalk or Wellenkalk (Middle Trias or Franconian) and of the conditions under which certain plant-species may thrive. The author examines the soil physically and chemically and concludes that not the chemical but the physical constitution of the soil, or in other words the soil structure is of most importance for the generation of seed and its further growth. The book is valuable for the soil specialist.

CHARLES L. HENNING.

POLAR

Wissenschaftliche Ergebnisse der Schwedischen Südpolar-Expedition, 1901–1903. Unter Leitung von Dr. Otto Nordenskjö ld. Vol. 1 Lieferungen 3 and 4: Die Gesundheits- und Krankenpflege während der Schwedischen Südpolar-Expedition, Okt. 1901-Jan. 1904. Über "Präserven-Krankheiten." Von Erik Ekelöf. 53 pp. Map. Vol. 3, Lieferung 1: Über die Alttertiären Vertebraten der Seymourinsel. Von Carl Wiman. 37 pp. Ills. Lieferung 2; Contributions to the Geology of the Falkland Islands. By J. G. Andersson. 38 pp. Maps, ills. Lieferung 3: Über die Tertiäre Flora der Seymour-Insel. Von P. Dusén. 27 pp. Ills. Lithographisches Inst. des Generalstabs, Stockholm. 1908. 11 x 8½.

Fossil vertebrate remains of the Eocene were found in the N. E. part of Seymour Island, West Antarctica, about one hundred and sixty-four feet above sea level, upon a rolling plain that is several hundred meters long and wide. This plain is between the N. E. border and the more elevated region, forming the greater part of the island. The ground where the fossils were found, consists of loose sandstones and conglomerates, resting upon granite. The fossils were widely scattered upon the slopes of the conglomerate. The bones were

mostly broken. They represented remains of penguin *(Anthropornis Nordenskjöldii, Pachypterix grandis, Eosphoeniscus Gunnari, Delphinornis Larsenii, Ichtyopterix gracilis)*. Among other fossils a *Terebratula* and a *Lingula* were noted.

The first account of the geology of the Falkland Islands group, we owe to Charles Darwin, who visited East Falkland in 1854 on the *Beagle*. East Falkland is chiefly low, slightly undulating with flat coasts. It is crossed from east to west by a mountain range of medium height (Wickham Heights, 1,300 to 1,600 feet, Mount Usborne 2,230 feet). West Falkland is in general higher than East Falkland and in many places its coast forms high, steep cliffs. Isolated mountains are here and there, the highest being Mt. Adam, (2,276 feet). Numerous big bays indent the two large islands on all sides. The main formation of the lowlands is a sandstone series (Devonian) of yellowish color, fine grained and often micaceous, with intercalations of clay-slate. The sandstone is highly fossiliferous and shows, where exposed, a peculiar weathering, like that of our Dakota sandstone (Lower Cretaceous) in Colorado. Above the low undulating surface in East Falkland, rise mountain ridges of hard quartzite, striking chiefly E-W. Numerous diabase dikes cut the Devonian sandstone almost vertically or in a steep dip north. The tectonic structure of West Falkland is still almost unknown.—The bottom of the valleys, in many parts of the island, is covered by fragments of quartz, a phenomenon called "stone rivers." The stones show no signs of being waterworn, but are only blunted. The width of the beds varies from a few hundred feet to a mile. Andersson believes that these blocks and fragments are derived from the bands of quartzite in the ridge above them, for they correspond with them in every respect. Andersson is of the opinion that the beds of quartzite, being of different hardness, the softer rocks were worn away in time and the compact quartzites were left as projecting ridges along the crests and flanks of the hill-ranges. With the disintegration of the softer beds, the support of the adjacent beds was taken away from the denuded quartzites, and thus they gave way, the fragments falling upon the gentle slopes of the hillside. When in summer the melting of the snow has reached an advanced stage, the bottoms of the valleys are often free from snow, while big masses still remain in sheltered places on the valley sides. Every warm day new quantities of water trickle from these melting drifts into the rock-waste at their lower edge. As the detritus is composed not only of coarser rock fragments, but also of finer particles filling the interspaces between the coarser material, they are able to absorb considerable quantities of water. When once saturated, they form a semi-fluid substance that moves slowly down hill. To this process, the slow flowing of masses of waste saturated with water from higher to lower ground, Andersson has given the name "solifluction" (compare also his paper on "Solifluction," a component of subaërial denudation, *Journ. of Geology*, vol. 14, 1906, p. 91-112). Andersson brings out the fact that the Falkland Islands were not glaciated during the quaternary, but says: "After all, it seems very probable that the conditions of the Falkland Islands during the ice age were very much like those now prevailing on Bear Island, a sub-glacial climate with a complete melting away in the summer time of the winter's snowcover, a powerful and widely extended solifluction, caused by the snow melting and a scarce and scattered vegetation, that in many places succumbed to the flowing soil."

The flora of Seymour island, West Antarctica is of Tertiary age, but is considerably older than that of the flora at Barrancas de Carmen Sylva or the flora of the Fagus Zone of the Magellan islands. CHARLES L. HENNING.

PHYSICAL GEOGRAPHY

Geographie des Atlantischen Ozeans. Von Prof. Dr. Gerhard Schott. xii and 330 pp. Maps, index. C. Boysen, Hamburg, 1912. Mk. 23. 10½ x 7½.

This is a valuable reference-book, such as was to be expected from Dr. Schott. It was not designed for continuous reading. The features and pheno-

mena of an ocean are so varied that a work on them cannot be a unit to a greater extent than the possibility of putting such of them as can be mapped on a single base map. The topics are the history of exploration, the geology of shores and basin, the physical character and properties of the ocean and its basin, its depths, climates, animals and human pathways. Apart from the printing, the mapping and the frontispiece, which are all works of art, solid contents characterize the book, but it is written clearly and readably.

Is there a man who wants to know what the Gulf Stream has to do with the mild climate of western Europe? He may learn here. To the Gulf Stream is assigned a region, six per cent. of the area of the North Atlantic, between 32° and 42° north and bounded on the east by the 40th parallel of longitude. This lies wholly south of the transatlantic steamer track. In the Newfoundland and West European regions, the stream is called the Gulf Stream Drift, "which we in Europe call the Gulf Stream" (165). "One important and certain conclusion should be set forth as touching the heart of the matter—the Atlantic warm water drift would do Europe no good at all if the masses of warm air over the ocean were not at the same time borne far into western Europe by the southwest winds that prevail in our latitudes. The coast of Norway, if it had prevalent easterly winds, would participate in the severe winters of Sweden and Russia, however full its fiords might be of warm water." For Schott the Labrador current plunges under the Gulf Stream Drift east of the Banks of Newfoundland. The cold water along the American coast (he calls it tragic, but it brings our good fishing grounds 500 miles further south than the European ones) he attributes to the Gulf of St. Lawrence and the upwelling of bottom water under the prevalence of offshore, *i. e.,* westerly winds, bringing it into the same class with the cold water on the west coast of Chile and South Africa.

Wisps of reversed current are described at the southeast border of the drift south of Newfoundland, which may carry a ship back to the southwest fifty miles a day.

The geologic chapter is perhaps the least satisfactory. We meet Trabert's account of the origin of the Atlantic basin by greater cooling of the floor under the cold deeps of the ocean than where the ocean was not; somewhat circular reasoning. No mention of Pickering's much more satisfactory conception of an Atlantic Rift accompanying the birth throes of the moon from the Pacific.

The North Atlantic crossing is said to indicate the overwhelming importance of the United States to the Old World, for over half the total sea traffic of the world travels that route. On it we have seen the Gulf Stream proper is not touched. On this trip, too, one is nowhere a thousand miles from land. For sailing ships this is a less important route. German sailing ships, at any rate, mostly traverse the Atlantic on their way to the Indian and Pacific Oceans.

Madeira, the Azores, the Canaries and the Cape Verde islands are mostly of gneiss and clay-slate, partly covered by volcanics, as if scraps of continents, though rising from great depths.

Areas are given constantly. Thus on the very well-designed map of ocean bottom deposits we find 53 per cent. of globigerina, 25 terrigenous, and 15 red clay.

The mapping of the tints of ocean water is new. It is a pity that they are not reproduced exactly (the frontispiece shows it is possible), and the inevitable errors of the first attempt would be rapidly corrected. It seems strange to find interrogation points only in the Caribbean on the Panama route, also the omission of the strong muddy tint at the great river mouths, the most striking experience on actual voyages. Novel is the area with less than 2½° C. range in its air temperatures along the Amazon from the heart of South America well out toward Africa.

The large map of ocean depths has much new detail, especially toward the Antarctic. The Deeps west of the Atlantic Ridge are open to the south, allowing Antarctic water to creep northward along the ocean floor as far as Newfoundland, warming by the earth's internal heat as it goes. This cannot happen in the eastern Deeps on account of the Walfish Bay Ridge.

An admirable diagram shows at Gibraltar the *sinking* of the warm but salt Mediterranean under water from the west as it emerges into the Atlantic. It is recognizable by its high temperature in the depths off the Irish coast.

Pressure and temperature charts also have changed in the light of new data and noticeably in the polar regions. Instead of polar lows we have here lows at 62° north and south, with a quarter centimeter higher pressures nearer the poles. The stormy Cape Horn passage is thus a trough of low pressure, often passable to westward by crossing to its southern border 200 miles south of the Cape.

Non-German work gets scant recognition excepting Maury, named often and warmly. The work is not exhaustive, but highly suggestive, and has a bibliography and a good index. It has been designed to give information to a somewhat studious type of general reader. Only Germany could produce such a work.

The great German steamship companies have aided in the printing, which is admirable. The maps are well planned to illustrate, projection and all, Lambert's azimuthal being used for most of the physical features. A superb color print reproduces Schnars—Alquist's painting of the "The Blue Atlantic Deeps," for frontispiece. Artist and color printer have succeeded in conveying an almost adequate impression of the unforgetable Atlantic of the Trades. It is better even than Lafcadio Hearn's word picture. MARK JEFFERSON.

Aus der Vorzeit der Erde. Von. Dr. Fritz Frech. I. Vulkane einst und jetzt. 112 pp. II. Gebirgsbau und Erdbeben. 130 pp. III. Die Arbeit des fliesenden Wassers. Eine Einleitung in die physikalische Geologie. IV. Die Arbeit des Ozeans und die chemische Tätigkeit des Wassers im allgemeinen. V. Steinkohle, Wüsten und Klima der Vorzeit. VI. Gletscher einst und jetzt. 2. wesentlich vermehrte Auflage. Maps and ills. in each. In series Aus Natur und Geisteswelt, Vol. 61. B. G. Teubner, Leipzig, 1911. Mk. 1.25 each. 7½ x 5.

The six volumes form a part of the excellent series "Aus Natur und Geisteswelt," published as a means towards the popularization of many branches of pure and applied science. The volumes by Frech form a treatise on physiography in concise form and up to date. They are a popular exposition of well-known facts, very useful for the readers in view, but, of course, making no original contribution to science. In Vol. I, Frech describes the phenomena of volcanoes, taking Vesuvius, Etna, Mont Pelé and the volcanoes of Hawaii and Samoa as typical examples. "The composition of the Atlantic eruptives is entirely different from those of the Pacific," he says. "From the volcanic vents in the Pacific belt, torn up through lateral torsion, the lighter eruptives with a predominating content of lime and magnesia rise, while from the Atlantic faults of depression, the heavier eruptives with a predominating content of soda, clay and iron are emerging" (I., p. 57). In the chapter on the after effects of vulcanism, Frech describes the geysers and cognate phenomena. He explains the volcanic forces as due to the wasting of gases from the earth's interior. But as the escaping of gases takes place through the fissures and faults of the earth, such catastrophes will cause earthquakes upon a larger scale. Thus the earthquakes are not of volcanic but of tectonic origin and come to pass through a sequence of processes, connected with mountain-making, *viz.*, folding, sinking and torsioning of the earth's crust. (p. 108).

In Vol. II, Frech gives a concise explanation of the elementary terms in geology, such as folds, faults, dislocation, etc., and explains the various phases of mountain-making. Vol. III deals with the work of flowing water and the formation of valleys. Vol. IV with the formation of soils and with climate and its relation to man. The various forms of hills and mountains, plains and peneplains and their relation to the work of wind and water erosion are described. The sculpturing of the land by sea waves, the difference in hardness and resistance of rocks and an outline of the principal facts of paleogeography form an important part of the volume.

The origin and distribution of coal and oil are described in Vol. V, together with a chapter on climatic conditions in past ages of the earth's history. Vol. VI deals with the work of ice and snow, with glaciation and the glacial periods in the various parts of the globe.

The volumes are profusely illustrated and it is gratifying to note that Frech uses many illustrations, dealing with American subjects. There are excellent views illustrating physiographic phenomena, in the Bad Lands, Yellowstone Park, Grand Canyon, Alaska, etc. CHARLES L. HENNING.

ANTHROPOGEOGRAPHY

The World's Cane Sugar Industry: Past and Present. By H. C. Prinsen Geerligs. xvi and 399 pp. Maps, index. Norman Rodger, Altrincham (Manchester), 1912. 12s. 10 x 7½.

The first forty pages of this book form a short treatise on the general history of the cane sugar industry—a somewhat sketchy account of the various sugar making processes of many ages and races, and the effects of both constructive and destructive political forces on the industry. Most of the book is a detailed regional treatment of the subject. Twelve pages are devoted to the United States and the treatment includes a discussion of the climate and soil, a history of the introduction and growth of the industry, cane cultivation and sugar manufacturing and the economic and political phases as labor, duties and combinations. The volume is, on the whole, a reference book of the first order. The author has collected a great quantity of material and has submitted his facts, statistics of population, climate, production, etc., rather than generalizations. R. M. BROWN.

ETHNOLOGY

Das Rassenproblem unter besonderer Berücksichtigung der theoretischen Grundlagen der Jüdischen Rassenfrage. Von Dr. Ignaz Zollschan. vii and 491 pp. Wilhelm Braumüller, Leipzig, 1910. Mk. 8.40. 9½ x 6.

From the moment of the appearance of the first edition of this work in 1910 (it has now advanced to a third edition) Dr. Zollschan's really brilliant monograph took immediate and double rank as a classic and a storm center. It is a most interesting example of the distance to which a student of wide culture may be led in the course of his prosecution of a somewhat narrowly restricted theme. In the Germanic races, and above all in Austria, it was a matter of great moment to comprehend the Jewish question and it was to this problem that the author addressed his efforts. But he found that it was impossible to deal with but a single race, despite the fact that it is the most strongly accentuated in modern societies. He was irresistibly led to the consideration of what constitutes a race and after that definition has been successfully formulated it was next necessary to establish the principles, speech, environment, mode of life, which have contributed to the distinction of recognized races.

With his central theme, which in the present edition is reduced to the last third of his volume, the constitution of our society tends to give us less concern. In Austria, where conditions of life have reached a state of poise, the alien prosperity of the Jews causes friction. In our land, still as for three centuries absorbing and assimilating varied race material, we may be curious as to this particular item of our citizenship but not at all anxious nor seriously concerned.

In his general statement of the problem of race we find much that will prove instructive and entertaining. Some of his deductions will not prove wholly acceptable to the great body of students of ethnology, in fact Zollschan has been subjected to some very sharp criticism by his European colleagues. Yet the principles which he has set forth are so simple and so massive that we may regard them fairly as established principles of race differentiation. In his assignment of the causes of race differentiation he is more open to dispute, yet in the main his conclusions, we are quite confident, will in time be accepted as basic, for he has succeeded in harmonizing the anthropological, the physiological and the historical elements of the problem. WILLIAM CHURCHILL.

ANTHROPOLOGY

Ancient Types of Man. By Arthur Keith. In series: Harper's Library of Living Thought. xix and 151 pp. Ills., index. Harper & Brothers, New York, 1912. 7 x 4½.

This is a small book but none the less it is distinctly suggestive and readable—all in all, a noteworthy contribution to anthropo-biological literature. Dr. Keith gives us more than the title promises, dealing as he does not only with the "ancient" but also with the more and then the most ancient types—the oldest human remains yet found in England, the continent of Europe, Java, and finally in North and South America. Chapter XV, containing his conservative view of the antiquity of the race in the New World, will be regarded as one of the most interesting parts of the book. In brief, he reasons that as in the Old World remains of man have been found dating back to the beginning of the first Interglacial Period, and as no remains of man have been found in America which belong to an earlier period than the present temperate one, therefore "mankind appears to have attained its modern form long before America was first inhabited." This is certainly the conclusion towards which the studies of our ablest investigators both in North and South America tend.

EDUCATIONAL GEOGRAPHY

Maps: How they are made; How to read them. By H. N. Dickson. 66 pp. Maps, ills. G. W. Bacon & Co., Ltd., London, 1912. 6d. 7½ x 5.

A little book intermediate between a professional manual and an elementary text; it will be useful to those who would appreciate something of the intricate processes of map making. Chapter one describes the principles and instruments involved in surveying. Mapping to scale, methods of indicating relief, and plane tabling and map projection are the principal topics in the second chapter. "Map reading" is the title of the third chapter in which, after a brief summary of the preceding principles, the common symbols and common physiographic features are described.

F. V. EMERSON.

Map Projections. By Arthur R. Hinks. xii and 126 pp. Diagrams, index. University Press, Cambridge (Engl.) 1912. G. P. Putnam's Sons, New York. 9 x 6.

This book is a welcome and valuable addition to the bibliography of map projections. It approaches closely the realization of the difficult ideal of a simple popular book that shall be as accurate as a scientific treatise. The measure by which it fails to meet fully this ideal is small, and fortunately is not on the side of accuracy but rather on the side of popular simplicity in the chapter on "The Simple Mathematics of Projection." But omitting this chapter the reader whose higher mathematics are not fresh in his mind may still find a clear and satisfactory introduction to the subject of map projections and an illuminating discussion of the projections in common use. Criteria for judging projections, numerical errors in projections, rules for identifying common projections, lists of projections in well-known atlases are a few of the many topics happily treated which indicate the tone of the book. For those who do not care for the pure mathematics of map projection but who do wish a thorough discussion of the general principles of the subject and of the construction and the use of the common map projections the book is especially commended.

R. S. HOLWAY.

The World. Regional Geography. By J. B. Reynolds. vii and 360 pp. Maps, index. A. and C. Black, London, 1912. 3s. 6d. 8½ x 5½.

The reader is made too sensible of the author's effort in this volume as described in the preface, namely, ". . . for the preparation for such examinations

as the Oxford Locals or Matriculation . . ." All the continents and their respective subdivisions are discussed with particular reference to their structure, relief and climate with a few of the economic responses cited more or less incidentally. The amount of ground covered in the 350 pages, considerable portions of which are occupied by maps, necessitates extreme brevity which oftentimes proves detrimental to the discussion. Although the author intends the book as a text "for the middle and upper forms of secondary schools" in England, it undoubtedly will serve better as a ready reference book.

The numerous maps, most of which are of the sketch-map variety, and all of which are black and white, add very materially to the treatise. Unfortunately their extreme generalization leads to inaccuracies at times. For example, the map on page 201 entitled "The St. Lawrence" indicates needless distortion of the states bordering on the Great Lakes; and the caterpillar method of portraying the mountains presents incorrect impressions of the topography. Parallels and meridians are omitted in many instances. These should always be indicated. EUGENE VAN CLEEF.

GENERAL

The Evolution of Sea Power. By P. A. Silburn. xiv and 288 pp. Index. Longmans, Green & Co., New York, 1912. 9 x 6.

A readable, instructive book. The author traces the history of sea-power from its dawn in about 2000 B. C. from nation to nation through its military colonizing and commercial stages to the present. The discussion purposely neglects essentially all other factors and exalts marine manœuvers in world history.

Instead of putting the responsibility for the development and supremacy of a coast city upon its hinterland the burden is placed upon the navy and sea-power. With this one theme uppermost the author does not keep his balance as well as some other writers on geography and history. While strong for the "sea-sense" in nations he does not recognize the "conference-sense" which may well be expected to develop with a recognition of geographic conditions and their influences. But when discussing navies for British colonies he strongly urges alliance and not independence. He is a loyal English officer.

In the closing chapter on Modern Sea-Power it is pointed out very acceptably that dominance does not depend upon number, size, power or cost of armament alone, but upon mercantile marine, colonies and their relations to the nation, number, distribution and defense of naval bases, capacity of a country to build vessels and the "sea-sense" of the people, all of which grow out of geographic conditions and not out of legislative enactments. G. D. HUBBARD.

A History of Geographical Discovery in the 17th and 18th Centuries. By Edward Heawood. xii and 475 pp. Maps, ills., index. University Press, Cambridge, 1912. G. P. Putnam's Sons, New York. $3.75. 8 x 5½.

The book is one of the well known Cambridge Geographical Series. The fifteen chapters include the Arctic Region, 1560-1625; The East Indies, 1600-1700; Australia and the Pacific, 1605-1642; North America, 1600-1700; Northern and Central Asia, 1600-1750; Africa, 1600-1700; South America, 1600-1700; The South Seas, 1650-1750; The Pacific Ocean, 1764-1780. Russian Discoveries in the North East, 1700-1800; The Northern Pacific, 1780-1800; The Southern Pacific, 1786-1800; The French and British in North America, 1700-1800; Asia, Africa and Arctic, 1700-1800.

The plan of the work is in part regional and in part chronological, covering the period following the epochal Spanish and Portuguese discoveries. While the book is crammed with facts, the style is not factual and the work is an interesting and valuable contribution to the history of geographical exploration. A voluminous index adds to its value. F. V. EMERSON.

OTHER BOOKS RECEIVED

By Leon Dominian

These notes do not preclude more extended reference later

NORTH AMERICA

New Rivers of the North. The Yarn of Two Amateur Explorers. By Hulbert Footner. 281 pp. Map, ills. Outing Publishing Co., New York, 1912. 8½ x 6. [Information on the practically unexplored stretch of country between the Hay and Peace Rivers. Description of the Alexandra Falls.]

The Canada Year Book 1911. 2nd series. xli and 454 pp. Index. Census and Statistics Office, Ottawa, 1912. 9 x 6. [New tables, including population of Canada by provinces as well as of cities and towns according to the Census of June 1, 1911.]

Minnesota Trees and Shrubs. An Illustrated Manual of the Native and Cultivated Woody Plants of the State. By Frederic E. Clements, C. Otto Rosendahl and Frederic K. Butters. v and 314 pp. Ills., index. Rept. of the Botan. Surv., IX. Geol. and Nat. Hist. Surv., Univ. of Minnesota, Minneapolis, 1912. $1. 9 x 6½. [Text dealing with 100 genera represented by 274 species and some 25 varieties. Sequence of families is that of the Besseyan system. Of economic value. Profusely illustrated.]

Wonders of the Great Mammoth Cave of Kentucky, containing thorough and accurate historical and descriptive sketches of this marvelous underground world, with a chapter on the geology of cave formation. By Jas. W. Turner. 116 pp. Index. Ills. Turner Publishing Co., Carrier Mills, Ill., 1912. 6½ x 4½. [A description which would have been improved by more numerous illustrations.]

SOUTH AMERICA

Argentine einst und jetzt. Bearbeitet von Leopold Groebner. 61 pp. Ills. Verlag der "Südamerika," Freising b. München, 1912. Mk. 1.10. 8½ x 6. [Suggestive of German trading and colonizing activity.]

AFRICA

The Cotton Plant in Egypt. Studies in Physiology and Genetics. By W. Lawrence Balls. In series: Macmillan's Science Monographs. xvi and 202 pp. Ills., index. The Macmillan Co., New York, 1912. $1.60. 9 x 6. [Embodies results of researches of economic significance. Many of the data given apply equally to American crops.]

La frontière algéro-marocaine. Par André Colliez. 144 pp. Ills. Marcel Rivière, Paris, 1911. Fr. 3. 7½ x 5. [Description of the country between the sea and Bou-Denib. Considerations on the value of the Algerian frontier as a base of action for the development of French influence in Morocco.]

Livingstone and the Exploration of Central Africa. By Sir H. H. Johnston. viii and 372 pp. Map, ills., index. G. Philip & Son, Ltd., London, 1913 (?) 1s. 7 x 5. [A timely and low priced reprint of the excellent sketch of the African explorer's life which originally appeared in "The World's Great Explorers" series.]

ASIA

Flora of the Upper Gangetic Plain and of the Adjacent Siwalik and Sub-Himalayan Tracts. By J. F. Duthie. Vol. 2: Plumbaginaceæ to Plantaginaceæ. 266 pp. Supt. Govt. Printing, Calcutta, India, 1911. 3s. or Rs. 2. 7 x 5. [Distribution within the areas given in the title is indicated.]

EUROPE

Door Hollands Watertuin en Heuvelland. Een schets van ons land. Door Johan van de Haghe. 204 pp. Ills., index. La Rivière & Voorhoeve,

Zwolle, 1912 (?) Fl. 1.50. 8 x 5½. [Descriptive sketches of the country which may well supplement the more condensed form of an ordinary guide-book.]

SUISSE. Tome 2-Est. In Series: Guides Pratiques Conty. Douzième édition. Appenzell, Argovie, Bâle, Glaris, Grisons, Lucerne, Saint-Gall, Schaffhousen, Schwyz, Tessin, Thurgovie, Unterwald, Uri, Zug, Zurich. 352 pp. Maps, ills., index. Administration des Guides Conty. Paris, 1912 (?) Fr. 3.50. 5½ x 4. [Helpful to the tourist desiring to travel economically through German and Italian Switzerland. New maps and plans in this edition.]

EINE REISE NACH GRIECHENLAND. Bilder von der zweiten Universitäts-Reise. Von Prof. Dr. Eugen Oberhummer. xii and 105 pp. Ills. P. Gerin, Wien, 1912. 9½ x 7½. [Pen-pictures supplemented by numerous photographs. This memorial narrative of places visited is accompanied by valuable bibliographic notes on the geography of the regions seen. Data on botany and zoology also appended in separate form.]

LA RUSSIE ET SES RICHESSES. Par Étienne Taris. In series: "Les Pays Modernes." 247 pp. Map, ills. P. Roger et Cie, Paris, 1912 (?) Fr. 4. 8 x 5½. [Mainly an economic description of the country. Resources, industries and finance considered.]

THE RUSSO-TURKISH WAR 1877. A Strategical Sketch. By Major F. Maurice. Special Campaign Series, No. 2. xix and 300 pp. Maps. Swan Sonnenschein & Co., Ltd., London, 1905. Macmillan Co., New York. $1.60. 7½ x 5. [A review of military operations with comments on their results. The geographical phase appears to have been excluded from the technical discussions, despite its importance as an element affecting practically every movement of the campaign.]

THE SEA-KINGS OF CRETE. By Rev. James Baikie. 2nd edition. xiv and 273 pp. Map, ills., index. A. & C. Black, London, 1913. 8½ x 5½. [The first edition of this excellent work was reviewed in the *Bull.*, Vol. 45, 1912, pp. 382-383.]

ECONOMIC AND COMMERCIAL GEOGRAPHY

GEOGRAFIA COMMERCIALE, ECONOMICA, UNIVERSALE. Di Primo Lanzoni. Quinta edizione interamente rifatta e nella parte che riguarda la "Libia" considerevolmente ampliata. xiii and 480 pp. Series: Manuali Hoepli, Serie Scientifica 259-60. Ulrico Hoepli, Milan, 1912. Lire 3. 6 x 4½. [Deals chiefly with natural products, industries, trade, transportation, emigration and colonization. Leading facts presented without statistics. An elementary treatise.]

MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY

ORDNANCE SURVEY MAPS, Their Meaning and Use, with Descriptions of Typical Sheets. By Marion I. Newbigin. iv and 126 pp. W. & A. K. Johnston, Ltd., Edinburgh, 1913. 1s. 6½ x 5. [An attempt to teach recognition of the chief land forms on the 1-inch ordnance map. Text informing and suggestive. Descriptions of the Ordnance sheets indicated are highly educational, provided the sheets are available for reference along with the reading of the text. The author emphasizes this necessity.]

LES CARTES GÉOGRAPHIQUES ET LEURS PROJECTIONS USUELLES. Par L. Defossez. vii and 116 pp. Ills. Gauthier-Villars, Paris, 1910. Fr. 2.75. 7½ x 5. [Practical treatment of the subject. Suitable for the cartographer's elbow use. Discussion of the projection best adapted for special cases. Calculations of maximum deformation.]

DAS PHOTOGRAMMETER. Heydescher Konstruktion. Kurze Anleitung zum Gebrauche desselben nebst einer Einführung in die Phototachymetrie für Ingenieure und Geographen. Von Dr. Hugershoff. Herausgegeben von Gustav. Heyde. 47 pp. Ills. Konrad Wittwer, Stuttgart, 1912. Mk. 1. 7½ x 5. [A brief description of this instrument and the method of its handling.]

EDUCATIONAL

DESCRIPTIVE GEOGRAPHY FROM ORIGINAL SOURCES. Selected by F. D. Herbertson, edited by A. J. Herbertson. Asia, 3rd edition. xxxvi and 290 pp., 80 cents. The British Empire, xiv and 254 pp., 75 cents. The British Isles (selected by L. Jowitt), xix and 286 pp., 75 cents. Central and South America with the West Indies, 2nd ed., xxxiii and 239 pp., 70 cents. Europe, 2nd ed., xxiv and 299 pp., 90 cents. Maps, ills., and index in each. A. & C. Black, London, 1908-1912. Macmillan Co., New York. 7 x 5 each. [A series of geographical anthologies which are bound to assist the teacher of geography using them along with text-books and maps. The selections from various writers are almost of flawless excellence, both as regards subject-matter and style. They should aid materially in diffusing knowledge of foreign countries among young readers.]

THE INTERPRETATION OF TOPOGRAPHIC MAPS. A laboratory manual for use in connection with the topographic maps of the United States Geological Survey. To accompany beginning courses in physiography. By Rollin D. Salisbury and Arthur C. Trowbridge. v and 66 pp. Henry Holt & Co., New York, 1912. 35 cents. 7½ x 5. [Outline of method to teach familiarity with physiographic types and their representation on maps. Equally educational in illustrating the effects of surface phenomena and certain geological processes as revealed by land forms. The selection of U. S. Geological sheets listed for this purpose is valuable.]

LA TERRE. Géographie générale. Par P. Camena d'Almeida. 4th edition. 624 pp. Maps, ills. Armand Colin, Paris, 1909. Fr. 4.50. 7 x 4½. [Subject-matter arranged in educational order, and comprehensive without departing from its elementary form. Copious foot-notes often in the shape of short sketches reproduced from well-known texts.]

LESSONS ON SOIL. By E. J. Russell. In series: Cambridge Nature Study Series. xv and 131 pp. Ills. G. P. Putnam's Sons, New York, 1912. $.50. 8 x 5½. [Should be effective in stimulating rural education and the intelligence of country children by interesting them in their surroundings. Varied practical exercises suggested.]

GENERAL

NOTES AND QUERIES ON ANTHROPOLOGY. Edited for the British Assoc. for the Advancement of Science by Barbara Freire-Marreco and John Linton Myres. 4th edition. x and 288 pp. Index. Royal Anthrop. Inst., London, 1912. 5s. 7 x 5. [Edition revised to keep pace with recent progress. Supplies the uninitiated with the information needed to take anthropological notes.]

THE EARLY SEA PEOPLE. By Katharine E. Dopp. 224 pp. Ills. Rand, McNally & Co., New York, 1912. 50 cents. 8 x 6. [A successful attempt to place the history of primitive societies within the grasp of children's minds. The migration of hunters towards the sea coast and their beginnings as seafarers related in the form of a pleasant story.]

EXAMPLES OF PRINTED FOLK-LORE CONCERNING THE EAST RIDING OF YORKSHIRE. Collected and Edited by Mrs. Gutch. xxvii and 235 pp. County Folk-Lore, Vol. 6. Printed extracts No. 8. Folk-Lore Society, London, 1911. David Nutt, London, 1912. [A painstaking compilation.]

LE PRINCIPE DU MOUVEMENT DES EAUX SOUTERRAINES. Par J. Versluys. Traduit du Hollandais par F. Dassesse. 145 pp. W. Versluys, Amsterdam, 1912. Fl. 3.50. 10 x 7. [A review of the general theoretical considerations relating to the problem of underground flow.]

DANA'S MANUAL OF MINERALOGY for the student of elementary mineralogy, the mining engineer, the geologist, the prospector, the collector, etc. By William E. Ford. 13th edition. viii and 460 pp. Ills., index. John Wiley & Sons, New York, 1912. $2. 7½ x 5½. [An entirely revised and rewritten edition of this standard work. The order adopted in the description of species

has been changed to that of the chemical classification. The text is brief and direct and the treatment as untechnical as possible. Statistics of mineral production appended.]

AIDS TO SHIPPERS. 68 pp. Oelrichs & Co., Forwarding Dept., 5 Greenwich St., New York City. 9 x 7.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

For system of listing maps see p. 75 of this volume

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

MISSOURI-ARKANSAS-TENNESSEE, ETC. (a) Map of Earthquake Features of the New Madrid District in Parts of Missouri, Arkansas, Illinois, Kentucky, and Tennessee. By Myron L. Fuller, 1905. Base from Map of the Alluvial Valley of the Mississippi River by Mississippi River Commission, 1887. 1912. 1:750,000. 37°20′ - 35°7′ N.; 90°44′ - 89°3′ W. 9 colors.

(b) Map of Reelfoot Lake and its submerged drainage channels. [1:100,000]. [36°32′ - 36°21′ N.; 89°28′ - 89°17′ W.]

Accompany, as Pl. I facing p. 8 and Fig. 12 on p. 69, "The New Madrid Earthquake" by M. L. Fuller, *Bull. 494*, 1912.

[Map (a) affords an important delineation of the structure of that portion of the alluvial valley of the Mississippi which was affected by the tectonic earthquake of 1811-12. It distinguishes, in part, between: (1) Paleozoic uplands, (2) ridges and plateaus of Tertiary deposits, (3) prairie terraces and ridges, possibly in part due to uplift, (4) bottom lands of Mississippi, St. Francis and Black Rivers, (5) "domes" uplifted at time of earthquakes, (6) "sunk lands" depressed at time of earthquakes, (7) swamps due to normal causes, (8) areas submerged as result of earthquakes. Map (b) represents Reelfoot Lake, in the northwestern corner of Tennessee, which recently came into prominence because of litigation with regard to fishing rights in it, some of the contestants basing their claims on property lines which existed prior to the submergence of the land and the creation of the lake.]

CONNECTICUT. (a) Map of Parts of Stonington and Moosup Quadrangles, New London County, Connecticut, showing observations of strike and dip, joints, and shear planes. 1912. 1:62,500. 41°35′ - 41°25′ N.; 72°0′ - 71°49′ W. 4 colors.

(b) Geologic Map of Parts of Stonington and Moosup Quadrangles, New London County, Connecticut. 1912. Geology by G. F. Loughlin. Surveyed in 1905. Same scale and coordinates as map (a). 16 colors.

Accompany, as Pls. I and II, in pocket, "The Gabbros and Associated Rocks at Preston, Connecticut" by G. F. Loughlin, *Bull. 492*, 1912.

AFRICA

ABYSSINIA. Itinéraires en Ethiopie par M. Hubert Latham. Avril-Décembre 1907. 1:2,500,000. 10° - 5° N.; 37⅔° - 42⅔° E. With three insets: (1) [Anglo-Egyptian Sudan and Abyssinia, 1:37,000,000, showing location of main map]; (2) Carte hypsométrique: Essai d'après les Altitudes relevées par M. H. Latham. [1:6,250,000]. Same extent as main map. (3) Forêts. [1:6,250,000]. Same extent as main map. Accompanies, as Fig. 1 on pp. 1 and 2, "Au Sidamo et chez les Gallas Aroussi" by H. Latham, *La Géogr.*, Vol. 26, 1912, No. 1, pp. 1-6.

[Valuable route survey, mainly along the Abyssinian portion of the Rift

Valley. The altitude layers on inset (2) are bounded by the contours of 1,500, 2,000 and 2,500 meters. The map represents almost the maximum range of expression possible in a black-and-white map.]

BRITISH EAST AFRICA. The District between the Victoria Nyanza and the Kisii Highlands. By Dr. Felix Oswald. 1:400,000. 0°19′ - 1°2′ S.; 33°55′ - 35°0′ E. 3 colors. Accompanies "From the Victoria Nyanza to the Kisii Highlands" by F. Oswald, *Geogr. Journ.*, Vol. 41, 1913, No. 2, pp. 114-130.

[Valuable map of the region adjoining the southernmost British portion of the east coast of the Victoria Nyanza. Drainage in blue; relief in approximate contours in brown: interval 250 ft. Soundings in the lake from British Admiralty Chart No. 3252.]

GERMAN EAST AFRICA. Reisewege am unteren Rufiji (Deutsch-Ostafrika). Nach Originalaufnahmen von Dr. Joachim Graf von Pfeil. Juni 1910. 1:200,000. 7°44′ - 8°5′ S.; 38°23′ - 38°49′ E. 3 colors. Taf. 30, "Die Entstehungsgeschichte des unteren Rufiji" by J. Graf von Pfeil, *Pet. Mitt.*, Vol. 58, II, Oct., 1912, pp. 198-201.

[Route survey.]

MOROCCO. Neue Grenzen von Frankreich und Spanien in Marokko nach dem Vertrag vom 27. November 1912. [In two parts:] (1) Die neue französisch-spanische Grenze in Nordmarokko. 1:2,000,000. 36°10′ - 33°30′ N.; 6°50′ - 2°10′ W. 3 colors. (2) Die neue französisch-spanische Grenze in Südmarokko. 1:5,000,000. 32° - 20° N.; 18° - 7⅓° W. 3 colors. Accompanies, as Taf. 4, "Der Abschluss des Marokkohandels" by H. Wichmann, *Pet. Mitt.*, Vol. 59, I, Jan., 1913, pp. 21-22.

[The Rif region (shown on map 1), which has definitely become Spanish by the treaty of Nov. 27, 1912, embraces an area of 8,250 sq. miles according to planimetric measurements made on this map (see text p. 22), and extends in a strip along the Mediterranean from the Muluya R. west to the Strait of Gibraltar and beyond to the Atlantic slope with the exclusion of Tangier. The territory thus includes the former Spanish presidios Ceuta, Melilla, etc., on the Barbary Coast. In the south (map 2) the Spanish colony Rio de Oro has been extended northward to include the African coast opposite the Canary Islands, aggregating an area of about 121,000 sq. miles. Ifni (29⅓° N. and 10° W.), with an area of 175 sq. miles, remains Spanish, an enclave in French territory, while Tangier and its environs (225 sq. miles) remain neutral. See also map listed under "Morocco, etc." in *Bull.*, Vol. 45, 1913, No. 2, p. 158.]

ASIA

CHINA. (a) Esquisse de la région entre le Yang-Tseu et le Si-Kiang. 1:3,850,000. [30° - 22⅔° N.; 109° - 114° E.]

(b) Carte de l'entrée du canal entre le Siang-Kiang et le Tan-Kiang à Sseu-ngen. Dressée par le capitaine P.-A. Lapicque. [1:4,000]. [25°35′ N. and 110°43′ E.]

(c) Carte de la sortie du canal à Ta-yong-hien. Dressée par le capitaine P.-A. Lapicque. [1:4,000]. [25°30′ N. and 110°23′ E.]

Accompany, as Figs. 2, 3 and 4 on pp. 13, 15 and 16, respectively, "Le canal de Sseu-ngen: Communication entre le bassin du Si-Kiang et celui du Yang-tseu" by P.-A. Lapicque, *La Géogr.*, Vol. 26, 1912, No. 1, pp. 11-17.

[Maps (b) and (c) detailed sketches of the two ends of the canal connecting the drainage basins of the Si-Kiang and the Yangtzekiang, first constructed in 214 B. C. It makes possible uninterrupted water communication by sampan between Canton and Pekin via the Grand Canal.]

INDIA-TIBET. Map to illustrate the Geographical Results of the Abor Expedition by A. Bentinck. 1911-12. 1:500,000. 29°15′ - 27°42′ N.; 94°15′ - 95°42′ E. 2 colors. With inset [N.E. India], 1:15,000,000, showing location of main map. Accompanies "The Abor Expedition: Geographical Results" by A. Bentinck, *Geogr. Journ.*, Vol. 41, 1913, No. 2, pp. 97-114.

[Valuable map of the ill-known region embracing what is probably the southern part of the transverse valley of the Brahmaputra through the Hima-

layas, although the identity of the Dihong River, the river explored, with this part of the Brahmaputra's course is not fully established. Relief in brown shading, drainage in blue. The map is a reduction of the provisional survey on the scale of 1:253,440 made during the expedition by Capt. O. H. B. Trenchard, R.E., and produced by the Survey of India.]

TURKEY IN ASIA-RUSSIA. Der voraussichtliche russisch-türkische Kriegsschauplatz in Armenien. [Two maps:] (1) Russisch-türkisches Grenzgebiet Batum-Kars-Erserûm. 1:1,000,000. 41°45′ - 39°35′ N.; 41°10′ - 43°25′ E. 4 colors. (2) Militärgeographische Skizze von Armenien. Entworfen von v. Hoffmeister. 1:2,000,000. [42°47′ - 38°33′ N.; 39° - 46° E.] 3 colors. Accompany, as Taf. 15, "Armenien: Eine militärgeographische Studie" by E. v. Hoffmeister, *Pet. Mitt.*, Vol. 59, I, Jan., 1913, pp. 105-110.

[Map (1) a topographic map (relief in gray shading); map (2) shows roads, military and other, and railroads. Position of Vladikavkaz to the E.S.E. of Oni, on map (2), incorrect.]

EUROPE

CENTRAL EUROPE. (a) Blatteinteilung der Übersichtskarte von Mitteleuropa 1:300,000 herausgegeben von der Kartographischen Abteilung der Königl. Preuss. Landesaufnahme. [1:6,000,000.] 60° - 46° N.; 1⅔° - 34⅓° E.

(b) Uebersichtsblatt zur topographischen Specialkarte von Mittel-Europa im Massstabe 1:2,000,000 herausgegeben von der Kartographischen Abtheilung der Königl. Preussischen Landesaufnahme. [1:5,000,000.] 58⅓ - 44⅓° N.; 2⅔° W. - 29° E.

Accompany, as Taf. 20 and Taf. 18, *Pet. Mitt.*, Vol. 59, I, Feb., 1913.

[Map (a) a copy of the official index map of a map of central Europe in five or six colors in course of publication by the Prussian Topographical Survey similar in scope to that published by the Austrian Military Geographical Institute (cf. under "Other Map Accessions," *Bull.*, Vol. 43, 1911, p. 552, and under "Austria-Hungary, etc.," Vol. 44, 1912, p. 479). Map (b) index map of an older general map of central Europe (the so-called Reymann'sche Karte), which is being superseded by map (a).]

GERMANY. (a) Übersichts-Blatt zu der Karte des Deutschen Reiches im Massstabe 1:100,000. Bearbeitet von der Kartogr. Abt. der Kgl. Preuss. Landesaufnahme, dem Topogr. Bureau des Kgl. Bayerischen und der Abt. für Landesaufnahme des Kgl. Sächs. Generalstabes, sowie dem Topogr. Bureau des Kgl. Württemb. Kriegsministeriums. (Oct. 1912). [1:2,500,000]. 56½° - 47° N.; 4⅓° - 23⅓° E.

(b) Übersichtsblatt zur Topographischen Übersichtskarte des Deutschen Reiches in 1:200,000. Herausgegeben von der Kartographischen Abteilung der Königl. Preuss. Landesaufnahme. (Sept. 1912). 1:3,500,000. 56° - 47° N.; 5⅓° - 23⅓° E. Taf. 17 and Taf. 19, respectively, *Pet. Mitt.*, Vol. 59, I, Feb., 1913.

[Map (a) a copy of the official index map of the standard topographic map of the German Empire in 674 sheets. There are three editions: two in black, one engraved on copper and the other a lithographic transfer therefrom; the third in three colors. Of this last edition about 240 sheets have been published, of the other two, all sheets. Map (b) the official index map of a map of Germany in colors based on the above standard map in 1:100,000. In Sept. 1912, 172 sheets out of a total of 196 sheets had been published.]

GERMANY. Übersicht der seit dem Jahre 1877 von der Königlich Preussischen Landesaufnahme im Massstabe 1:25,000 der natürlichen Länge veröffentlichten Messtischblätter. Oktober 1912. [1:1,000,000]. Blatt 1 [N. W. Prussia. 56° - 53° N.; 6⅓° - 14⅓° E.]. Blatt 2 [N. E. Prussia. 56° - 53° N.; 14⅓° - 23° E.]. Blatt 3 [S. W. Prussia. 53°0′ - 49°48′ N.; 5°50′ - 14°20′ E.]. Blatt 4 [S. E. Prussia. 53°0′ - 49°48′ N.; 14⅓° - 19⅓° E.]. Blatt 5 [Alsace-Lorraine. 49°48′ - 47°12′ N.; 5°50′ - 10°30′ E.]. Accompany, as Taf. 5-9, "Die Veröffentlichungen der Kgl. Preuss. Landesaufnahme im Jahre 1912" (by H. Haack), *Pet. Mitt.*, Vol. 59, I, Jan., 1913, p. 24.

[Copy of the official index maps of the largest-scale government map of

Prussia, the so-called plane table map in 1:25,000. The 1911 edition of these maps was listed under "Germany" (third entry) in the *Bull.*, Vol. 44, 1912, p. 239.]

GERMANY. Die Insel Ruden (nordwestl. v. Usedom) in den Jahren 1695 und 1910. Von Dr. F. W. Paul Lehmann. 54°12′ N. and 13°46′ E. 3 colors. Taf. 31, "Die Ostseeinsel Ruden einst und jetzt" by F. W. P. Lehmann, *Pet. Mitt.*, Vol. 58, II, Oct., 1912, pp. 203-204.

[Two maps illustrating the gradual demolition of this small island in the Baltic lying to the southeast of Rügen.]

GERMANY. Magnetische Karte vom Deutschen Reich 1912. [Two maps:] (a) I. Blatt: Linien gleicher Horizontalintensität (Isodynamen der Horizontalintensität) für 1. Januar 1912. Einheit: 1 C. G. S. Nach den Ergebnissen der magnetischen Landesaufnahmen, mit Benutzung weiterer magnetischer Messungen entworfen von Karl Haussmann. 1:1,500,000. 1 color. With two insets: (1) Isodynamen der Horizontalintensität für 1901,0 im magnetischen Störungsgebiet der Ries und Umgebung. Gemessen und berechnet von Prof. K. Haussmann. 1:500,000. 49°30′ - 49°0′ N.; 7°25′ - 8°30′ E. 1 color. (2) Isodynamen der Horizontalintensität für 1912,0 im Störungsgebiet bei Dresden. Gemessen und berechnet von Baurat Göllnitz. 1:500,000. 51° N. and 13°45′ E. 1 color.

(b) II. Blatt: Linien gleicher nördlicher Inklination (Isoklinen) für 1. Januar 1912. Nach den Ergebnissen . . . . entworfen von Karl Haussmann. 1:1,500,000. 1 color. With two insets. (1) Isoklinen für 1901,0 (remainder of title, scale and coordinates as in inset *a1*). (2) Isoklinen für 1912,0 (remainder of title, scale and coordinates as in inset *a2*).

Accompany, as Taf. 3 and 16, "Die magnetischen Landesaufnahmen im Deutschen Reich und magnetische Übersichtskarten von Deutschland für 1912" (first and second parts) by K. Haussmann, *Pet. Mitt.*, Vol. 59, I, Jan., 1913, pp. 11-15, and Feb., 1913, pp. 64-68.

[Lines of equal horizontal intensity in red. The four-sheet map of Germany in Stielers Hand-Atlas used as the base.]

EUROPE. Die Bevölkerungsverteilung in Europa. Versuch einer Volksdichtekarte von Dr. L. Weise. 1:10,000,000. 13 colors. Accompanies, as Taf. 2, "Darstellung der Bevölkerungsverteilung in Europa" (first part) by L. Weise, *Pet. Mitt.*, Vol. 59, I, Jan., 1913, pp. 7-11.

[Important map in view of the great number (13) of density of population grades shown, viz.: those included between the "isanthropic" lines of 0, 0.1, 1, 10, 25, 50, 75, 100, 150, 200, 300, 500 inhabitants to the square kilometer. In this very profusion of density grades, coupled with a most unfortunate color scheme, lies the chief weakness of this otherwise valuable map, namely, its confused appearance. The color scheme seems to have been chosen rather to bring out the contrasts between individual density grades than to combine them into their larger groups. Thus, progressing from low to high densities, the color sequence is: white, yellow, yellow-brown, deep pink, red-brown, violet, green, gray-green, lilac, mauve, blue, slate. If contrast be desired it certainly is not attained by the juxtaposition of deep pink (density 10-25) and red-brown (25-50), as in Ireland. The gray-green color for density 100-150 is not uniform on the map itself nor does it tally with its symbol on the legend. The article accompanying the map (pp. as above, together with pp. 60-63 in the Feb. number) contains no direct reference to the preparation of the map or to the principles which led to the selection of the colors used. The parts of the sea which support a temporary fishing population are indicated by special coloring, for which the symbol is lacking in the legend. The base map used is a photographic enlargement of Pl. 7 in Stielers Hand-Atlas, 1:15,000,000.]

SERVIA. Die Eisenbahnen und Befestigungen Serviens. Von k. u. k. Hauptmann Gustav Kuchinka. 1:1,500,000. 45°10′ - 43°20′ N.; 19°10′ - 22°50′ E. 1 color. Accompanies, as Taf. 35, article with same title by same author, *Pet. Mitt.*, Vol. 58, II, Oct., 1912, pp. 242-243.

[Distinguishes between standard and narrow gage railroads, existing, building and projected, and shows location of fortresses.]

SOUTHEASTERN EUROPE. Der Rückgang des türkischen Herrschaftsgebietes in Europa. 1:10,000,000. 50° - 35° N.; 14° - 33° E. [Eight maps entitled:] (1) Grösste Ausdehnung des türkischen Reiches in Europa im 17. Jahrhundert. 11 colors. (2) Die europäische Türkei vor 100 Jahren (Wiener Kongress 1815). 9 colors. (3) Die europäische Türkei bei Ausbruch des Krieges 1877. 11 colors. (4) Die Staaten der Balkanhalbinsel nach den Grenzbestimmungen des Friedens von S. Stefano, 3. März 1878. 11 colors. (5) Die Staaten der Balkanhalbinsel nach den Grenzbestimmungen des Berliner Vertrages vom 13. Juli 1878 und der Berliner Konferenz vom 24. Juni 1880. 14 colors. (6) Die Staaten der Balkanhalbinsel bei Ausbruch des Krieges 1912. 13 colors. (7) Das Serbische Reich in seinem grössten Umfang unter Stephan Duschan um 1346. 8 colors. (8) Das Bulgarische Reich in seinem grössten Umfang um das Jahr 1000. 6 colors. Accompany "Auf- und Niedergang des türkischen Herrschaftsgebiets in Europa" by N. Jorga, *Pet. Mitt.*, Vol. 59, I, Jan., 1913, pp. 1-4.

[Suggestive maps showing the decline of Turkish supremacy in southeastern Europe. Map (4) is especially instructive at this time, in that it shows clearly the boundary of Bulgaria as stipulated by the treaty of San Stefano (1878), the annulment of which by the subsequent treaty of Berlin (1878) afforded not the least of the causes of the present war.]

SWITZERLAND. Le parc national suisse. 1:300,000. [46°50′-46°35′ N.; 9°55′ - 10°25′ E.]. With inset [Switzerland], 1:5,000,000, showing location of main map. Accompanies, as Fig. 6 on p. 42, "Le parc national suisse et les ligues pour la protection de la nature" by E. Fleury, *La Géogr.*, Vol. 26, 1912, No. 1, pp. 40-44.

[Shows the "National Park" created in 1909 in the Lower Engadine which was recently increased in size.]

POLAR

ANTARCTIC. Stand der Südpolarforschung Februar 1913. Mit den Routen der Expeditionen von Filchner und Scott. 1:15,000,000. Polar cap within 60° S. 15 colors. Accompanies, as Taf. 13, "Der Stand der Südpolarforschung" (first part) by H. Wichmann, *Pet. Mitt.*, Vol. 59, I, Feb., 1913, pp. 57-59.

[Hardly has the news of the Scott, Mawson and Filchner expeditions reached the outer world when *Petermanns Mitteilungen*, with customary promptitude, publish this valuable Antarctic map—doubtless the first—showing the routes of these three expeditions, together with those of their predecessors since the beginning of the twentieth century (Amundsen, Shackleton, Bruce, von Drygalski, Nordenskjöld, Scott, 1902-03. Charcot is conspicuously absent). The route of the Filchner expedition is somewhat generalized; for the first official delineation see the map published in the *Zeitschrift der Gesell. für Erdkunde zu Berlin*, listed below.]

ANTARCTIC. (a) Die Vahsel-Bucht und ihre Umgebung im äussersten Süden der Weddell-See auf Grund der Originalaufnahmen der Deutschen Antarktischen Expedition. 1:450,000. 77°36′ - 78°0′ S.; 36°35′ - 33°43′ W.

(b) Das neuentdeckte Prinzregent Luitpold-Land und die Eisbarriere im Süden der Weddell-See auf Grund der Originalaufnahmen der Deutschen Antarktischen Expedition. 1:2,500,000. 76° - 78½° S.; 42° - 27° W.

(c) Kurs der "Deutschland" im Weddellmeer. 1:5,000,000. 53½° - 79° S.; 48° - 16° W.

Accompany, as Figs. 2 and 3 and Taf. 1, on pp. 3 and 5 and as separate plate, respectively, "Deutsche Antarktische Expedition: Bericht über die Tätigkeit nach Verlassen von Südgeorgien" by E. Przybyllok, *Zeitschr. der Gesell. für Erdkunde zu Berlin*, 1913, No. 1, pp. 1-17.

[The first maps to be published embodying the results of the German Antarctic Expedition under Filchner. The main result of the expedition was the discovery of a re-entrant into the Antarctic Continent, similar to that of the Ross Sea on its opposite side, extending beyond land discovered in 78° S.; an analogous ice-barrier to the Ross Barrier was also found. These regions are shown on maps (a) and (b) while map (c) shows the course of the *Deutschland* in the Weddell Sea, with the soundings taken.]

ATLASES

DER ERSTE PREUSSISCHE SEEATLAS, 1749 (Nouvel Atlas de Marine Composé d'une Carte Generale, et de XII Cartes Particulieres, qui Representent Le Globe Terrestre jusqu'au 82e Degré du Coté du Nord, et jusqu'au 60e du Coté du Sud, Le tout Dressé sur les Observations les plus Nouvelles et les plus approuvées. Dedié A Son Excellence Mgr. Le Comte de Schmettau, Gen. Feld-Marechall, Grand-Maitre d'Artillerie et Chevalier de l'Ordre de l'Aigle noir, etc. Qui a fourni pour Cet Atlas toutes les Cartes et tous les Memoires necessaires: par son tres humble et tres obeissant Serviteur Isaac Brouckner, Geographe de S. M. T. C. et Correspondant de l'Academie Royale des Sciences de Paris. Approuvé par l'Academie Royale des Sciences a Berlin l'Année 1749). Herausgegeben von Dr. M. Groll. Facsimile atlas in 14 loose plates, with text introduction. Dietrich Reimer (Ernst Vohsen), Berlin, 1912. M. 30. 19½ x 26 inches.

[A facsimile edition of a marine atlas of the world published in 1749 by the reorganizer of the Berlin Academy of Sciences, Field Marshal von Schmettau. Upon this institution Frederick the Great, the year before, had conferred the privilege of a censorship of all maps sold or engraved in Prussia. This measure, besides being directed against the importation—to use the phraseology of the edict—of the great quantity of poor and inadequate maps, atlases and geographical descriptions being put forth by the merchants and engravers of Nuremberg, imposed upon the Academy the duty of publishing original maps. The "Nouvel Atlas de Marine" was one of these publications. It is especially noteworthy as being the first marine atlas published in Germany on Mercator's projection. The atlas consists of a general chart of the world within the polar limits of 82° N. and 60° S., as the title indicates, and of twelve detailed sheets, covering the same area, for which the general chart serves as an index map. The detailed sheets are on the equatorial scale of about 1:21,000,000. To facilitate plotting positions each degree of latitude and longitude is drawn out. The map not only reflects a good knowledge of the contemporary sources, but sometimes also of material not yet published at the time, as for instance, in the delineation of the Siberian coast, where the surveys of Bering, Chelyuskin and others are utilized, although they were not published until 1763 by the St. Petersburg Academy. The state of knowledge of the time is exemplified by the non-existence of Torres and Bass Straits, New Guinea and Tasmania being hypothetically joined to Australia. The whole western coast of North America north of 45° N., which Cook was soon to unfold, is still unknown, and the mythical "River of the West" affords an outlet into the Pacific for the Lake of the Woods. A smaller plate containing compass cards and a diagram for the graphical solution of distance and course problems complete the atlas.]

MEYERS HISTORISCHER HANDATLAS. Mit 62 Hauptkarten, vielen Nebenkarten, einem Geschichtsabriss in tabellarischer Form und 10 Registerblättern. Bibliographisches Institut, Leipzig and Vienna, 1911. M. 6. 10 x 7 inches.

[A valuable historical atlas consisting, in part, of maps already published in Meyers Konversationslexikon. A special feature of this publication is the addition to each map of a summary of the history of the country shown. These summaries, taken together, practically form an epitome of world history. The geographical aspect of history finds extended expression in the atlas. Thus, Pls. 1 and 2 are devoted to the development of the knowledge of the earth and Pls. 60, 61 and 62, respectively to the history of discovery and exploration of the Atlantic, Pacific and Indian Oceans. The summaries accompanying these last three maps are especially valuable geographically. The addition on them of the ocean currents, however, especially in so pronounced a manner, although laudable in principle, obscures their legibility with respect to the features they are mainly intended to show. The history of civilization, as contrasted with purely political history, is well represented by such plates as Pl. 20 (Distribution of the Teutons and Celts in Central Europe from 500 to 50 B. C.) and Pl. 25 (Norman Invasions and States Founded by the Normans). Modern colonial history is illustrated by Pls. 48 (Growth of the British Colonial Empire), 57 and 58 (Colonial Development in Africa and Asia). Such modern topics as the Boer and Russo-Japanese Wars are represented by separate maps with insets for the principal battles. The relatively low price of the atlas and its handy size commend it as a general work of reference.]